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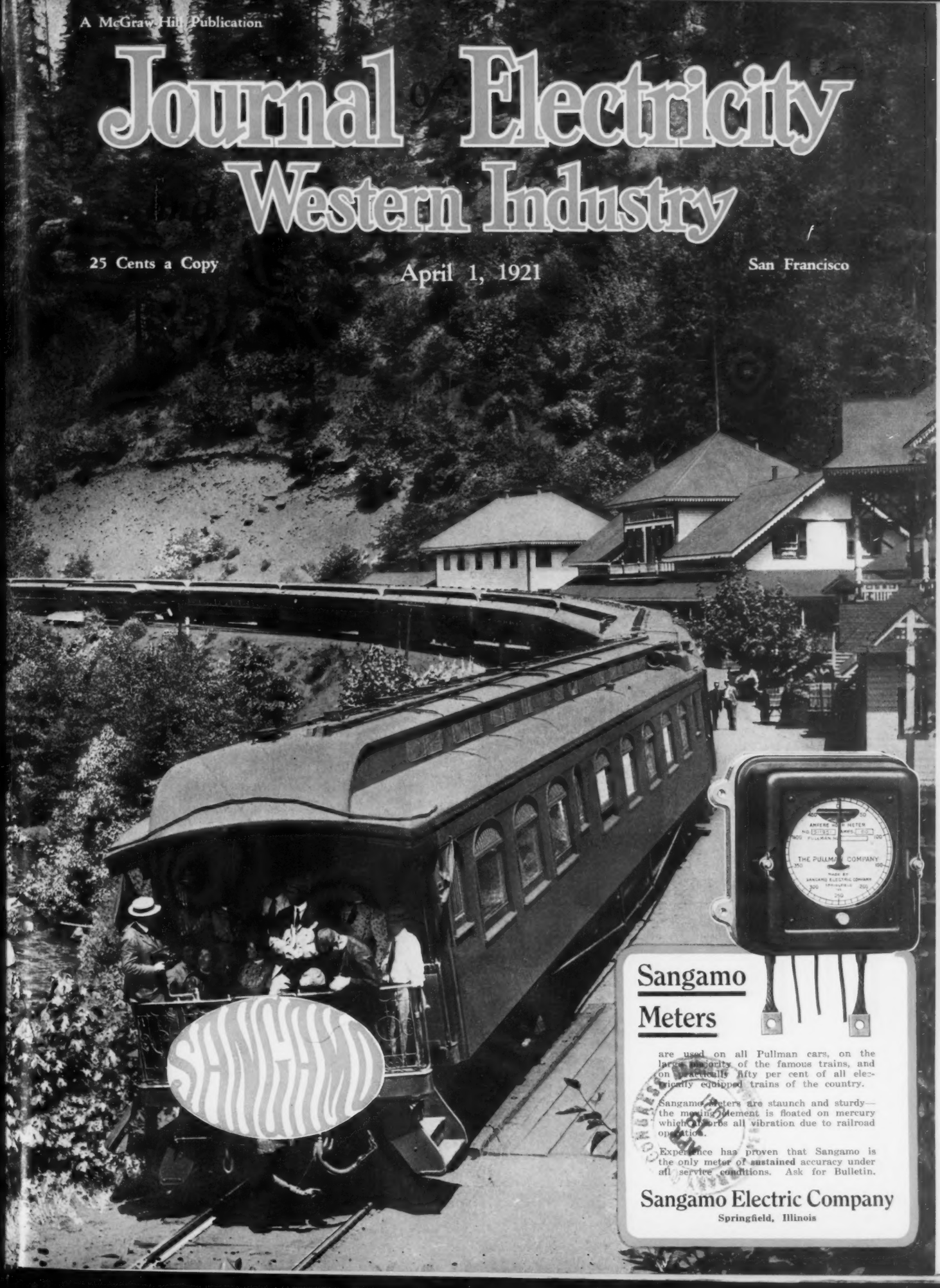

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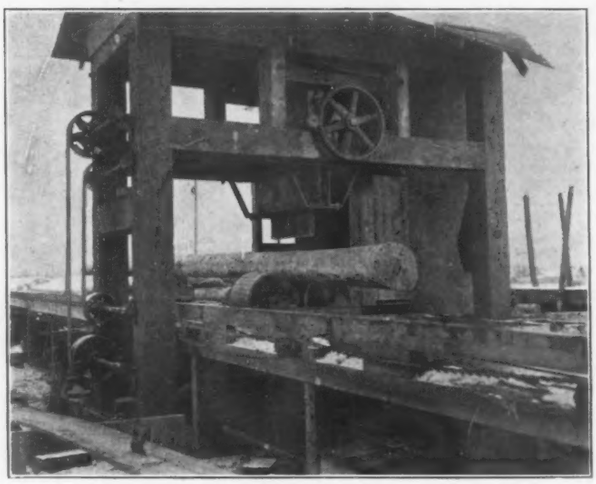

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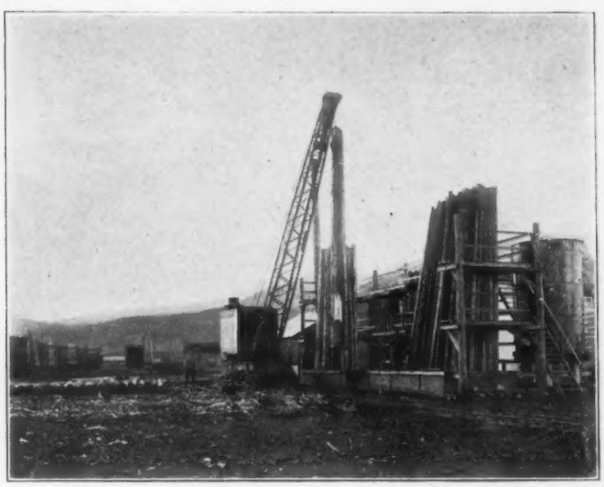

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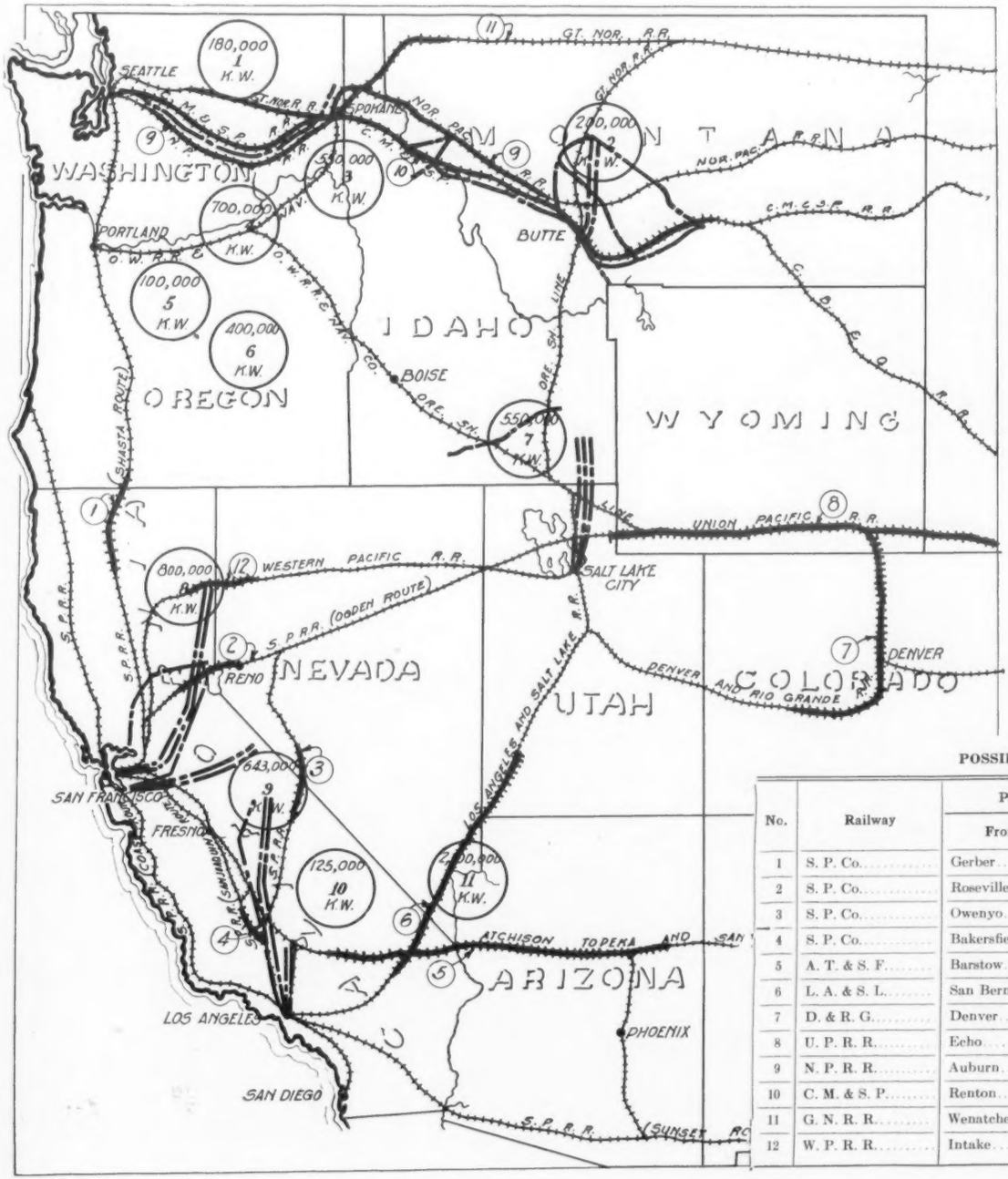

SHOULD IT BE DONE?

LAST year the United States consumed more oil than it produced and the West, owing to its extensive use of fuel oil for transportation purposes, shows an even less encouraging record. The fact that over forty per cent of the fuel oil consumed west of the Rocky Mountains is used by the railroads, that coal is not present in this region to bear any appreciable share of the burden, but that water-power, on the other hand, is abundant,—is bringing the possibility of railroad electrification more and more to the front as a topic for serious discussion. Has the time come for this electrification? The possibilities of the situation are indicated on the accompanying map. The main lines of transcontinental roads are here shown, with the mountain and other divisions around which the electrification discussion centers indicated by heavy lines numbered in small circles. On the same map are shown the principal undeveloped water-power resources of the West, marked by large circles, and transmission lines of more than 100,000 volts, indicated by broken lines. The successful electrification of the Chicago, Milwaukee & St. Paul has proven the physical possibility of the accomplishment—the question now is one of expediency. Is it the best thing for the West to save its fuel oil at this point? Will this region progress faster with the railroads electrified or with the power applied to diversified industries? Should it be done?

LOCATION OF UNDEVELOPED WATER-POWER RESOURCES
(Numbers in Large Circles)

Number	Location	Potential Undeveloped Horsepower
1	Skagit River	234,000
2	Missouri River	266,000
3	Snake River	715,000
4	Columbia River	910,000
5	Clackamas River	133,000
6	Deschutes River	520,000
7	Snake River	.....
8	Pit and Feather Rivers	1,040,000
9	Big Creek	836,000
10	Kings River	163,000
11	Colorado River	3,250,000
	Total Potential	**8,067,000 hp.**

POSSIBLE ELECTRIFICATIONS (Numbers in Small Circles)

No.	Railway	Proposed Electrification		Distance in Miles	Elevations Above Sea Level			Remarks—Nearest Large Source of Power
		From	To		Start	High Point	End	
1	S. P. Co.	Gerber	Ashland	215	246	4125	1860	Pit River
2	S. P. Co.	Roseville	Sparks	139	163	7018	4413	Bear River or American River
3	S. P. Co.	Owenyo	Mina	143	3697	7141	4542	Owens River
4	S. P. Co.	Bakersfield	Saugus	138	402	2657	1160	Big Creek
5	A. T. & S. F.	Barstow	Winslow	462	2103	7000	4356	Colorado River
6	L. A. & S. L.	San Bernardino	Milford	509	1076	5475	4968	Colorado River
7	D. & R. G.	Denver	Glenwood Springs	360	5280	10240	5758	
8	U. P. R. R.	Echo	Paxton	637	4545	8009	3054	Snake River
9	N. P. R. R.	Auburn	Billings	991	100	6356	3139	Missouri River
10	C. M. & S. P.	Renton	Harlowton	842	25	6322	4163	Already partially electrified
11	G. N. R. R.	Wenatchee	Shelby	601	648	5213	3283	Missouri River
12	W. P. R. R.	Intake	Gerlach	206	1100	4995	3931	Feather River

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Journal of Electricity and Western Industry

A publication devoted to the upbuilding of the great industrial West and the countries bordering on the Pacific

A McGraw-Hill Publication

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Interpreting Western progress through the application of electric power, light, and heat in industry and in the home

Vol. 46, No. 7 SAN FRANCISCO, APRIL 1, 1921 Per Copy, 25 Cents

The POISON OF PESSIMISM

THERE is a malicious propaganda going its rounds that has attempted to overturn much of the optimism that now prevails throughout the West and to submerge this growing community in a sea of inaction similar to that which prevails in other sections. It has not succeeded. America as a nation has little cause for pessimism; we are today the most powerful nation on earth in finances; our industries and agriculture are developed to a high state of perfection; our peoples enjoy a prosperity known nowhere else in the world—and yet this subtle propaganda has endeavored to undo our industries, close down our vast development work and bring inaction in all quarters at a period of the world's development when just the contrary is needed.

Retrenchment means going back to battlefields already fought and won, and there somewhat less actively than formerly, proceeding with the onward attacking of problems of the business world. Anything that hampers needful production or encourages idleness in our citizenry is not good for the body politic as a whole. Let us expend during such times as these unusual energy to keep production normal. Better indeed call out the reserves rather than encourage stagnation. It is a time to develop new fields of endeavor, to cast the vision afield and build to higher planes of attainment. Opportunity, as ever, is saying to those who are alert mentally: "Behold, I stand at the door and knock; if any man hear my voice and open the door, I will come in to him and will sup with him and he with me."

There is surely no inactivity or paralysis of mental energy so necessary in the development of an empire in the making. We of the West by inheritance through long years of tradition possess that energy, enthusiasm and vision that should give to the nation at this time what is needed to keep unfoldment in industrial activity under way. Thoughtful study reveals only substantiality and soundness of business endeavor in all sections of the West.

Spokane, Washington, is developing water powers immediately within its city limits that have lain dormant for many years. The city of Seattle has just sold two million dollars in securities to extend its municipal power system. The Portland Railway, Light and Power Company has placed over a million dollars in gold bonds in an unusually quick drive in recent days. California with her one hundred and seventy-six million dollars more in savings banks this year than existed a year ago, needs only to avail herself of her traditional vision and enthusiasm to keep foremost in the ranks of production that has so characterized recent months in hydroelectric and industrial development.

Let us all, then, with renewed energy, down this malicious propaganda that would endeavor to make itself felt in our body politic and create stagnation on all sides.

Problems of Railway Electrification

A progress report of the Superpower Survey of the Atlantic seaboard has been made by the committee appointed by the Geological Survey, and in it the facts are brought out that the electrification of the railways in the district covered by the survey will bring about a saving of six million tons of coal per year, or forty million dollars. The statement is also made that an additional saving of fifty million dollars annually can be made in the difference in engine repairs and maintenance. These figures are for the east coast where the coal shortage is attracting considerable attention, but in the West we are facing a shortage of the fuel oil upon which we depend for fuel for our stand-by steam plants, our railway locomotives, and for our merchant marine. Something must be done to conserve this fuel for those purposes where nothing else can be substituted.

The electrification of the railroads and the building of huge storage reservoirs will solve the problem of the railroads and steam stand-by plants, and release millions of barrels of oil annually for the use of the merchant marine. The question of where the power is to come from for the electrification of the railroads of the West is still to be solved. Whether this will be found only by an intensive survey similar to the Superpower Survey being made in the East, or be worked out by the existing agencies, is a point which should be determined. If the industrial growth of the West progresses at its present rate the power companies of the West will have their hands full financing the new plants which will be demanded by their increasing load, and they will be

able to dispose of the power available at a better rate than the railroad could afford to pay for it. The problem of finding the power will then be up to the railroads themselves, and they will be forced into it when the scarcity of oil makes operation by steam economically unfeasible. Then they will be compelled to develop their own power and duplicate the existing power companies.

Some system might be adopted whereby the railroads could electrify, using the plants of the power companies in times of excess water, and in the fall months using stand-by plants generating power from oil. This would result in a considerable saving of oil and would benefit both the railroads and the power companies. It is generally conceded that a saving in fuel could be made by the railroads even by electrifying and generating their power by oil; the power companies would increase their load at the time when water was ordinarily wasting and would obtain a better system load factor.

Increasing study should be given to the possibilities of the electrification of all the railways of the West, with particular reference both to the railways and to the electrical industry. The future of the West depends upon the judicious use of its natural resources, and before it is too late plans should be made that would develop and use these resources for the greatest good of the people as a whole, and not for the especial benefit of any particular industry or industries.

A Convention That Will Make History

The annual convention of the Pacific Coast Section, N. E. L. A. has been set for Del Monte, June 8, 9, and 10, 1921. The convention this year will depart from all previous traditions and establish a new and effective service to the industry that will unquestionably send abroad a new ideal of helpfulness to the electrical industry throughout the nation. Not only will this convention devote itself to the usual high class commercial and engineering papers, but the final day's session is to be in the nature of a Pacific Coast conference at which prominent bankers, industrials, engineers, commercial men and chambers of commerce will participate. The forty-eight major power companies of the West are now engaged in a master survey of the industrial and commercial development of the various communities in this growing section of our nation. This information is being recorded and tabulated through the office of the editor of the Journal of Electricity and Western Industry. Graphic charts are being drawn and a pictorial display being set up that will present the story electrical from a fresh angle and in such understandable and convincing terms that men at this wonderful conference should go back again to their communities with the story impressed upon them in such a way as to prove of untold helpfulness in months to come. These charts and pictorial displays will be backed up by tabulated data presented in bound form so that chambers of commerce in coming months may have this statistical information, simple, direct and in understandable language, for use in all published data that they send forth. It's a red letter day in the West. Put it down in your memo book: "Pacific Coast Conference, Del Monte, California, June 10, 1921."

Information of this sort has not hitherto been available. We are all familiar with the magnificent display of chamber of commerce data that has been presented to one who crosses the continent from the East to the West; but examine this material from beginning to end and little if any hydroelectric information is there to be found, and such as is found is often very scattered, indirect and inaccurate. Here, then, is a master method of tying up indissolubly with the civic and commercial organizations of the West the fundamental fact that as develops hydroelectric energy in the West so develops the West itself.

The Inman Report

The findings of the Inman Investigating Committee of the California State Legislature, printed in full elsewhere in this issue, certainly are complimentary to the method electrical and the development of the utility ideal in the West. This committee was called into existence by loud clamor from a supposed dissatisfied public for an investigation of the California Railroad Commission and its doings. Hearings were scheduled and put across throughout the state of California, and the remarkable testimony brought out at these hearings showed that not only was there no cause for real fundamental complaint, but on the contrary there exists a genuine feeling on the part of those best acquainted with the development of the utility ideal in this state that the Commission's authorities and powers should be extended rather than curtailed. The Inman Committee called attention to the fact that education is necessary, and well it may, for today the one essential lacking in the utility development of the West is the getting of the electrical message over to the people. But when the people once know its helpful message and what hydroelectric development means to the West, as was brought out at these hearings, there results only commendation and the calling forth of a helpful attitude on the part of the public.

No more powerful commendation of the principle of utility regulation could be quoted than the ringing words of the Inman Committee in its frank introductory statement. Throughout the nation these words will bring relief, and a new confidence in the ultimate triumph of the utility ideal in its effort to serve the people will be awakened.

The King Tax Bill

Few legislative periods have been fraught with more tense interest and public attention than the one just closed, with its fight over the King Tax Bill in California. So tense did it grow for the utilities that the West's leading figure, John A. Britton, dean of the industry, fighting in behalf of what he thought was right, became overpowered and collapsed at one of the hearings of the

California Legislature. This but gives an instance of the feeling that was broadcast throughout the state of California, and indeed throughout the West. The bill as passed will undoubtedly have the effect of more widely distributing the payment of taxes by the people, creating tax payers who otherwise would not be reached. So far as the public utilities are concerned, of course there must be ample provision made in rate regulation to take care of this extra demand. As electrical energy is used so widely, the result will be that many people who would otherwise escape the payment of taxes will thus be called upon to pay them. The unfortunate part of the whole situation is, however, that the people generally never appreciate an indirect tax as much as they do a direct tax. As a consequence the prodigal expenditure of moneys in the state of California will be overlooked by the people, much more than would be the case if the tax fell directly upon them and they could see clearly just how the increasing expenditures of the state affect them.

Higher Freight Rates and Western Industry

At the time of the inauguration of the higher freight rates, there was much speculation as to their effect upon western industries. From the standpoint of industries centering in this region and serving eastern markets, it is not yet apparent exactly what the outcome will be. From the Northwest comes the complaint of the lumber men that the export of lumber from this district will practically cease unless freight rates are modified. Rumors from Imperial Valley announce that no cantaloupes will be planted this season, as it is impossible to ship them at a profit.

It does not appear that in this fashion the railroads will receive a much larger income of freight than they received under lower rates. One of the interesting results of increased fares on street railways has been the reduction of passenger traffic, the reports of one interurban railway showing that their income remained practically stationary, even with a 30% raise in fares. It will be interesting to follow the experience of the railroads through the coming shipping season and note whether the higher freight rates have in fact enabled them better to meet their expenses.

The other side of the picture is shown in the case of industries heretofore located in the East, which have found their market on the Pacific Coast. A recent instance is that of a company with an eastern factory, which before the increased freight rates maintained a western representative, doing a yearly business in this region of about $50,000. The increase in freight rates cut their margin to such an extent that for some time they have not been interested in Coast business. The obvious effect of this situation is to turn $50,000 back into the western field, with a reflex development of western industry to meet this demand. Once again, however, it means a loss of freight to the railroads.

In the long run, of course, the balance sheet of the railroads will determine whether the higher rates are a necessity or even an advantage,—and the vital needs of western industry will work their way through the leveling effect of supply and demand. In other words, the purchaser will be asked to absorb the higher costs in the distant markets—and when the point is reached where he will do without rather than pay the tithe, the railroads must adjust their costs to lower rates, enforced by a falling off of freight.

In the meantime, the well established industrial activity now growing up in the West to meet the demand of local needs is so much permanent gain.

The Society for Electrical Development, Inc.

There has been much of good accomplished in the Society for Electrical Development in the past, and close students of the electrical industry must acknowledge that this great institution has well justified its existence. In the West, however, its influence has not been so keenly felt as should be the case. Perhaps the question of personal tie-in in a section of the country whose traditions always demand such a factor has more to do with the lack of appreciation in the West than anything else.

Recent announcement that W. L. Goodwin, known and beloved throughout the West, has received the appointment of assistant to the president, comes as a matter of great interest and potential importance to the West. Not only is Mr. Goodwin himself a product of the West, but his father before him pioneered in many an activity that had to do with the early inspiration and vision of that day, and came through the Golden Gate upon the vessel that bore the tidings of the admission of the state of California into the Union. The younger Goodwin is so well known to the industry throughout the West that it is needless for us to try to enlighten our readers as to the magnificent work he has done not only in this section, but throughout the nation as a whole, as well as in the commonwealth of Canada to the north.

Mr. Goodwin is a powerful exponent of facts and figures concerning the betterment of industry, and we commend the Society for Electrical Development in the highest degree for adding to its staff such an able and magnificent apostle of better merchandising and cleaner, healthier ideals in industry.

The Proposed Electrical Show

Discussion continues throughout the West relative to the holding of electrical shows this fall in various metropolitan centers of the West. Great emphasis is being given to keeping the question of personal gain out of the situation, and to suppressing any attempt of anyone to exploit the electrical industry for personal gain. It would seem to be, in fact, the unanimous opinion of all men of the industry that the affair in each city should be encouraged and fostered by the co-operative campaign in that particular district, and actually financed and promoted by the local electrical club or league in the district served. Journal of

Electricity and Western Industry heartily endorses this move, and it would seem that such profits as may accrue—and the profits should be no small sum—might well be applied to the account of the local development leagues, or cooperative campaign, or perhaps be divided equally between them.

Merchandising Shows and the Industrial Man

Merchandising conferences of two of the largest electrical manufacturers which are now visiting the West should be attended by all industrial men. While these shows are designed primarily to help the retailer of electrical merchandise to better his business, they hold a great deal of interest to the industrial user of electricity. This is particularly true in the sections of the conferences which are devoted to illumination, and since it has been proven that the output of an industrial plant can be increased by better lighting and by an adoption of individual motor drives on the various machines, the industrial man owes it to himself to attend these conferences and find out what the electrical industry is doing for him in the way of studying his problems and helping to provide the solution of them. Journal of Electricity and Western Industry commends these manufacturers for the step that they are taking and asks that the electrical and industrial men show their appreciation by attending and benefiting from them.

Another Attack of Bills and Fever

Sessions of state legislatures are coming to be looked upon by the average business man as a period of necessary suffering, somewhat like an acute illness or an Indian massacre during which attention must be centered on the work in hand, that of warding off invasion of germs or tomahawks. Bills of every conceivable nature are presented—radical, reactionary, foolish, wise and criminal in intent—and the indifferent citizen is in constant danger of waking up some morning to discover that his livelihood and the most intimate details of his personal behavior have been legislated from under him—and what is more, the bill for the alterations sent to him. Considering the variety of subjects upon which a legislator is asked to be a specialist, it is a tribute to the common sense of this body, combined with the eternal vigilance and enduring fighting powers of the above mentioned citizen, that no more damage is done.

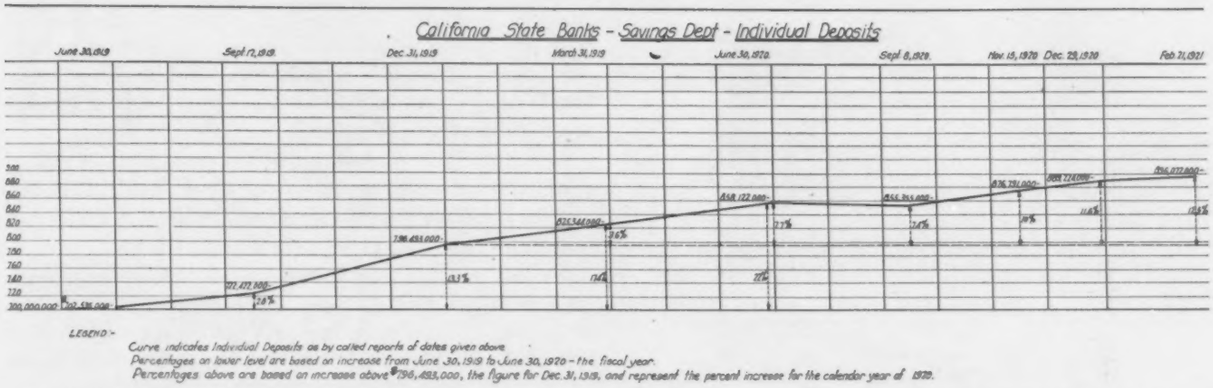
There are before the California legislature at the present time, for instance, some twelve bills relative to railroads which, if passed, will involve over four million dollars in capital expenditure and nearly nine millions in annual upkeep on the part of the railroads of the state. It is impossible for a layman to judge the merits of bills involving the question of whether locomotives with twenty-inch cylinders should be fitted with two radiators, or whether an extra brakeman should be carried on given trains—and it is impossible not to believe that the legislature must be in equal difficulty. The one fact which stands out is that the cost of these millions of expenditures must in the end come from the pocket book of the public—and the question is no light matter to be decided by hearsay. We already have Railroad Commissions, Accident Commissions and Interstate Commerce Commissions under whose jurisdiction such matters fall—and the presumption is that they are adequately safeguarding the interests of both labor and the public.

It may be argued that the eternal vigilance and the clean slate necessary to defeat these recurring proposals call for a healthy vigor and a good conscience on the part of business. We would not wish, perhaps, to guarantee the individual against attacks of sickness despite his habits, but on the other hand when such an attack arrives, the least that can be done is to help the patient to fight it off.

Consider the Diesel Engine

It is generally conceded that cheap fuel has been an important factor in bringing about industrial development in the West. In the Northwestern states and in certain localities in the Inter-mountain district, coal has, in the past, been obtainable at a comparatively moderate cost. Throughout California and the Southwest, oil was abundant and cheap. But the day of cheap oil is past, and the continuation of the present rate of production is questioned, at least in California. The price of coal can only be reduced by lessening transportation charges and production costs, and even then it will be available at a low price in but limited areas near the mines. Oil is being called upon to supply products for a market in which the price is, relatively, a secondary consideration. If the West is to become a manufacturing section of importance, cheap power must be obtainable.

There are certain sections of the West where hydroelectric energy is not now available, and where power can only be obtained by the use of fuel oil. There can be no question but that in these localities the Diesel type of engine will supply power at a moderate cost. Where hydroelectric power is available the Diesel engine will furnish stand-by power at a less cost than a steam plant, and yet there is not an installation of this kind in the West. There are a few facts in connection with Diesel engine operation and design that should be investigated by those who are responsible for power plant installations. In the first place, this type of engine has demonstrated its absolute reliability and low maintenance cost. Second, the Diesel engine is nearly three times as efficient in the use of fuel as the best steam power plant, and, unless coal can be obtained at approximately a third of the cost of fuel oil, can produce cheaper power, the slightly higher first cost of the Diesel type of engine being offset by lower operating and maintenance costs. Two-cycle Diesel engines are now available that will produce from six to seven thousand horsepower per unit, and units range from this size down to a few hundred horsepower. In terms of electric energy, about 500 kw-hr. are produced per barrel of oil.


California State Banks - Savings Dept - Individual Deposits
June 30, 1919
Sept 17, 1919
Dec 31, 1919
March 31, 1919
June 30, 1920
Sept 8, 1920
Nov 15, 1920
Dec 29, 1920
Feb 21, 1921
LEGEND -
Curve indicates Individual Deposits as by called reports of dates given above
Percentages on lower level are based on increase from June 30, 1919 to June 30, 1920 - the fiscal year.
Percentages above are based on increase above $796,493,000, the figure for Dec. 31, 1919, and represent the percent increase for the calendar year of 1920.

Here is shown the remarkable growth of California state banks from June 30, 1919, to June 30, 1920, recording an increase of 22%, and from December 31, 1919, to February 21, 1921, an increase of 12.5%, which indicates the substantial character of Western financial institutions.

WESTERN BANKING INSTITUTIONS SHOW REMARKABLE INCREASES IN DEPOSITS

There have recently appeared in the daily press of the nation published statements emanating from New York City, to the effect that the eastern banking institutions of the country have during the past year experienced greater increases in deposits than have those of the West. There seems to be some doubt as to whether the statement referred solely to mutual savings banks.

Charles F. Stern, superintendent of banks for the state of California, appealed to on this subject, has given an interesting interview to a representative of Journal of Electricity and Western Industry that should be welcomed by all men of the West, as it shows the magnificent growth of savings banks in California, a growth which is indicative of the growth in other commonwealths of the West. Mr. Stern spoke as follows:

"The newspaper clipping to which you refer covers in my opinion only the mutual savings banks. You will note that the reference to mutual savings banks is specific as to the Middle Western states. In California we have only one mutual savings bank, the Hibernia of San Francisco.

"My statement at your banquet, as published on page 197, Journal of Electricity and Western Industry, Feb. 15, 1921, is that the state banks of California entered the new year with total resources $176,000,000 in excess of the figure as of January 1, 1920. This increase was in both savings and commercial departments. I am furnishing you a plan showing the savings bank situation. You will note that there is quite a difference between the increase in savings deposits for the fiscal year June 30, 1919, to June 30, 1920, and the calendar year December 31, 1919, to December 29, 1920, due to the tremendous increase in the last six months of 1919. You will however, note that for the calendar year the increase was 11.6% which is considerably higher than the New York banks showed and which has been further increased to 12½% as of February 21, 1921. The increase for the fiscal year 1919 to 1920 was 22%, which I believe surpasses that of any other state."

WYOMING MANUFACTURES FOR 1919 AS REPORTED BY THE CENSUS BUREAU

A preliminary statement of the general results of the census of manufactures for the state of Wyoming for the year 1919 and a summary comparing the figures with those for the year 1914, has recently been issued by the Bureau of Census, Department of Commerce. The summary shows exceptional increases during the five-year period due to the tremendous increase in the petroleum refining industry, the totals for which are not shown to avoid possible disclosure of individual operations.

In the order of their importance from the percentage standpoint, the increases for the several items rank as follows: Materials, 658 per cent; value of product, 624 per cent; value added by manufacture, 591 per cent; wages, 382 per cent; salaries, 217 per cent; capital, 183 per cent; wage earners, 120 per cent; salaried employes, 113 per cent; proprietors and firm members, 90 per cent; primary horsepower, 76 per cent; and number of establishments, 70 per cent.

	CENSUS		Per cent of increase
	1919	1914	1914 to 1919
Number of establishments	572	337	69.7
Persons engaged in manufacture	8,017	3,696	116.9
Proprietors and firm members	556	293	89.8
Salaried employes	883	414	113.3
Wage earners (average number)	6,578	2,989	120.1
Primary horsepower	17,624	10,004	76.2
Capital	$82,891,000	$29,270,000	183.2
Services	12,824,000	2,843,000	351.1
Salaries	1,684,000	531,000	217.1
Wages	11,140,000	2,312,000	381.8
Materials	42,156,000	5,559,000	658.3
Value of products	81,272,000	11,223,000	624.2
Value added by manufacture	39,116,000	5,664,000	590.6

Summary for the state of Wyoming, of manufactures for 1919 and 1914, as published by the Bureau of Census, Department of Agriculture. Preliminary figures.

The capital invested, as reported in 1919, shows a gain of $53,621,000 or 183 per cent, over that of 1914. The average value per establishment was approximately $145,000 in 1919 and $87,000 in 1914. The cost of materials used in 1919 shows an increase of $36,597,000, or 658 per cent, over 1914. The value of products in 1919 shows an increase over that of 1914 of $70,049,000, or 624 per cent. The value added by manufacture represents the difference between the cost of materials used and the value of the products manufactured from them. The value added by manufacture in 1919 shows an increase over that of 1914 of $33,452,000, or 590 per cent. The value added by manufacture in 1914 formed 50.5 per cent of the total value of the product, and in 1919 48.1 per cent.

Graphs showing the ratio of mill return to freight charges on lumber from the Pacific Northwest and from the Southern Pine District.

SOME OF THE EFFECTS OF INCREASED FREIGHT RATES ON THE WEST COAST LUMBER INDUSTRY

On articles of considerable value the increase in freight rates which went into effect last August has had but slight effect, thus on clothing and manufactured products a few cents per pound adds but a relatively small amount to the cost. On low grade materials and certain raw and semi-manufactured products a few cents per pound increase in freight may result in a loss of market. This effect has been particularly noticeable in the lumber industry of the Pacific Northwest which is now in a precarious position in manufacturing a market in the Middle West. The accompanying graphs show how important a factor railroad rates are in delivering West Coast lumber to eastern markets and contrast the mill return with freight charges, in January 1921, on lumber from the West Coast and from the Southern Pine district. The first two items represent lower and less valuable grades of lumber, the third flooring, one of the better grades. The better grades of lumber average only 20 per cent of the West Coast products while the lower grades average 80 per cent. The returns upon an average carload of West Coast and Southern Pine lumber, delivered in Chicago are divided as follows:

West Coast, total return $1,005; freight $600; mill $405
Southern Pine, total return $940; freight $340; mill $600

The figures and graphs are from statements of the West Coast Lumberman's Association, who are responsible for the further statement that the increase in freight rates has virtually wiped out two-thirds of the normal market of lumber from the Northwest.

This is a condition that is seriously affecting other industries besides that of lumber production, in fact, all raw and semi-manufactured materials from the West are in difficulty of maintaining Eastern markets. It is a problem that everyone is interested in; that affects not only the producer but those dependent upon him. If the normal movement of freight from west to east continues to decrease it will ultimately result in increased rates from east to west, and while this may stimulate manufacture in the West to a certain extent, there is certain to be a transition period of hardship.

GEO. OTIS SMITH, DIRECTOR U. S. GEOLOGICAL SURVEY MAKES FURTHER STATEMENT ON "MARSHALL PLAN"

The prominence given to Colonel Marshall's connection with the U. S. Geological Survey as related to his qualifications as a promoter of the plan for the utilization of the waters of California for irrigation, water power and municipal supply has caused Geo. Otis Smith, Director of the Survey, to expand the brief statement given to the California press.

The expanded statement discusses the many factors that enter into the Marshall plan and determine its feasibility. These are grouped under four headings—physical, engineering, economic and human. The physical factors include topography, stream flow and geology. The engineering factors include the design and construction of dams, reservoirs, power plants, canals and other structures adequate for storing water for drainage, and for the transportation of the water through an elaborate system of main and lateral canals. The economic factors relate to the cost of the development and to the evaluation of the resulting benefits, to which must be added the enormous indirect costs involved in the abandonment of developments already made. The question of financing such a gigantic project is one that cannot be answered without a tremendous expenditure of time and money.

We quote:

"Neither the United States Geological Survey nor any member of its staff has initiated, seriously considered, or indorsed the Marshall plan, either as a whole or in any of its important details, nor has the Survey's work been directed to a solution of the many problems involved. The only information collected by the Survey which is applicable to the solution of these problems relates to the physical factors of topography, water supply and geology. Of these factors, Colonel Marshall, during his connection with the Survey, was officially concerned only with topography. This information has been collected not to assist in promoting any particular project but to serve as a basis for any public use."

INCREASE IN FOREST PRODUCTS OF BRITISH COLUMBIA

The Minister of Lands in his annual report states that pulp and paper products sold by British Columbia mills during 1920 amounted to $21,000,000. An increase of over $22,000,000 was shown for the year in the total value of the forest products.

Pulp and paper increased in value from $12,000,000 to $21,000,000 during the year, and it is expected that there will be a great expansion in the pulp and paper figures during the coming year.

General view of the Pullman Company repair shops at Richmond, California, where the standard sleepers and observation cars are rebuilt after eighteen months' service on the road. Nearly every trade is represented as the cars have to be entirely torn down, repaired and rebuilt

The Use of Electricity in the Rebuilding of Pullman Cars

Richmond Plant of Pullman Company Presents Aspect of Model Industrial City With Completely Electrified Industry. All Trades Represented in Rehabilitation of Standard Sleepers

BY FRED E. BECK
Manager, Pullman Shops, Richmond

WITH electricity being used in every possible way and in many different operations, the plant of the Pullman Company at Richmond, California, has the appearance of a completely electrified industrial city. In this plant the Pullman cars being forwarded to the shops by the Operating Department are thoroughly renovated and repaired, a process which calls for every class of artisan from the machinists who repair the frame-work of the cars to the upholsterers who finish up the seats.

Preparation for Repairs

When a car comes into the yards it is thoroughly inspected to determine the amount of work that will have to be done upon it and is then put upon a schedule which must be lived up to by each department, as the cars are only allowed to remain in the yards for a certain length of time. The car is first dismantled, all fixtures and parts being removed until only the bare skeleton of the car remains. The steel frame-work is then inspected, tested, sand-blasted and painted. While this operation is being performed the body of the car has been removed from the trucks which have been subjected to a rigid examination, and new wheels applied where necessary.

The wheel house where all the steel wheels are prepared for use on the trucks is completely electrified. The hydraulic press which forces the wheels upon the axles, exerting a pressure of over one hundred tons, is driven by a seven and one-half horsepower motor. The lathe used for turning down the wheels is driven by a fifty horsepower motor. The boring machines used to ream out the center of the wheels, which must be done extremely accurately, is also motor driven, as are the other drill presses, buffers, and emery wheels in this department. The car bodies after being removed from the trucks are put in the car shop where there are twenty-four stalls, and there the outside and inside of the car are completely gone over, missing bolts and rivets replaced, worn parts removed and new ones substituted, and the frame-work made as good as the day on which it was first built.

Machine Shop Equipment

Adjoining the car barn is the machine shop, wood working shop, tin shop, plumbing department, and other departments which renew the parts of the car that show signs of wear. In the machine shop are fabricated all of the metal parts which make up the car. The power for the machines in this shop is supplied from a fifty-horsepower motor driving a line shaft which runs the length of the shop. Shapers. turret lathes, drill presses and all the other equipment found in a model machine shop are here, as the demands made upon this department are many and varied.

Tin and Woodworking Departments

In the tin working and plumbing department behind the machine shop all the plumbing in the car and all the brass work is given a thorough overhauling. tested, repaired, and then nickel plated or given whatever finish is required, and is ready for re-

installation. All the lavatory equipment is replated and comes out as good as new. The power for the nickel plating is obtained from a 6-volt, d.c., 65-ampere motor generator set.

The wood working plant, located above the machine shop, gets its power for the stickers, sanders, and planers from a line shaft driven by the same fifty-horsepower motor as is used in the machine shop, with the exception of the large planer which is driven by a special seventy-five horsepower motor.

The wood machine department has installed a cut out or rather an emergency shut down which is attached to the 50-hp motor. These cut outs are distributed throughout various sections of the departments. In the event of broken pulley shafting, hot boxes, and more particularly, injuries to employes, by simply pulling down on the handles of any of the cut outs of machinery in these departments, shuts down the entire department in less than thirty seconds, which is practically impossible with any other motive power. Every kind of wood work is done in this department, from the making of furniture for use in the observation cars to the head boards which are placed between the berths when they are made up. The cabinet shop, which is on the same floor with the wood working department, does all the fancy finishing work on the closets, doors and berths. From here all the woodwork is passed on to the varnishing department where it receives the high glossy finish and is turned out ready to put into the cars and to go back into service. The elevators used all over the plant are driven by twenty-horsepower motors and have a capacity of five thousand pounds each.

After the curtains, blankets, pillow and mattress cases have been laundered or dry cleaned they are inspected and repaired by electrically driven sewing machines. The window curtains and hammocks are repaired here also.

Upholstering

The blankets, pillows and mattresses have a department all to themselves. The mattresses are ripped open, all the hair removed and re-carded by a special machine driven by a five-horsepower motor, which blows all the short hairs and dirt out of the filling, leaving the material ready to be put back into the mattresses. The feathers in the pillows are taken out, washed in live steam, dried by hot air and stacked up fresh and clean ready to be used again. This machine is also driven by a five-horsepower motor. The ticking which was used in the mattresses and pillows is sent to the laundry for complete renovation, and the laundry would rejoice the heart of anyone boosting the use of the electric washing machine. There are two huge electrically driven washing machines and two centrifugal driers. One of these sets is used for washing the casings of the mattresses and pillows, using live steam and plenty of soap, and the other machine is used for the cleaning of the curtains, drapes and hammocks by gasoline. When these have all been dried and ironed they are sent to the upholstering department where the mattresses are made up again and the pillows re-stuffed. Here also the upholstering of the car seats and chairs is gone over, washed, recovered, and seats re-stuffed and put into good condition.

The sewing of the curtains, pillows, etc., is done by girls with electrically driven sewing machines. Adjoining the sewing room is a kitchen with an electric range where hot dishes are prepared each noon by one of the girls who takes the time during the working hours. Besides the kitchen there is a dainty and airy rest room provided by the company for its women employes.

Testing and Repairing Electrical Equipment

All the electrical equipment on the cars, including panel board, lighting fixtures and globes, storage batteries and generators, is removed and tested. The lamps are reopalized, the fixtures rewired and the armatures on the fan motors rewound when necessary. A special machine for rewinding the motor armatures has been devised by the foreman of the Electrical and Machine departments and they are now able to wind an armature in three-quarters of an hour where before it used to take from three to four hours to do by hand. The storage batteries are completely torn down, new separators and acid put in and charged up ready for re-installation.

Power Supply

The plant is supplied with power at 11,000 volts from the lines of the Great Western Power Company which is stepped down to 440 volts for distribution around the plant by three 100-kva. transformers, housed by themselves with the control panel for the entire plant. Electricity is used for everything around the plant with the exception of the air compressor which is steam driven, the air being used for the sandblasting machine and for one hoist used to handle the car axles.

The largest single installation in the plant is a 150-horsepower motor used in driving the transfer table on which cars are carried from one part of the yard to the other and from building to building. While the connected load of the plant is only approximately six hundred and fifty horsepower, the interest to an electrical man lies not in the size of any one piece of equipment but in the diversified uses to which electricity is put. Examples of industrial installations of almost every type are available for study and special problems are met in every department.

The lighting throughout is modified for the uses of the various departments as each department has need for a different intensity of light.

Reinforced concrete, fireproof, sectionalized shop of the Southern Pacific Company at West Alameda. All rolling stock is inspected and repaired in this completely electrified and modern plant.

View of the machine shop, lathe for turning commutators in foreground, wheel lathe in background. All machines are equipped with individual electric drive, only a few small machines being operated from a line shaft.

The West Alameda Shops of the Southern Pacific Company

(A highly specialized machine shop is necessary for the maintenance of an electric interurban system and in the shops of the Southern Pacific Company at West Alameda this is found. Each piece of machinery is driven by an individual motor, and the plant is typical of the high efficiency found in the electrical department of the Southern Pacific Company.—The Editor.)

Maintenance of suburban electric train equipment has been made a standardized operation by the Southern Pacific Company to such an extent that the usual term "car repair shops" does not correctly define the function of the West Alameda shops of the company. Efficiency of the equipment in operation is obtained by frequent inspection together with regular and thorough overhauling. As a result there is obtained a maximum degree of safety; in fact, it is the stated policy that the thorough inspection is first of all for safety, efficiency and maintenance costs being secondary considerations.

The shop at West Alameda was designed and put in service in 1911 to take care of the electric train equipment operated in Berkeley, Oakland and Alameda; no change in cars or shops has been needed since that time, a fact which is certainly a great credit to the men who designed the system. Fifty-one route miles of track branch from two ferry terminals over four, two, and single track lines. For regular operation 116 cars are used, and there are 888 train movements per day. Trains consist of from one to eight cars, depending on traffic requirements, about one-third of the cars being trailers. Since the trains feed ferry boats and one train from each route must arrive at the ferry terminal simultaneously, with a maximum allowable delay of two minutes, it is apparent why all rolling equipment must be maintained at the highest efficiency.

Inspection of Equipment

Equipment is inspected on a mileage basis in order that the attention given will be proportional to the service to which it is subjected. The shop consists of a fireproof, reinforced concrete building, and is divided into individual sections by fireproof walls, which not only would confine a fire to a small portion of the shop but also improves working conditions. All large machines have individual electric drive. The motors are equipped with a starting rheostat which automatically releases at any interruption of the current, and motors will not start up when power is returned to the line. In that portion of the shops where overhead cranes are used, portable trolleys are provided for moving cars in the shops. To energize the trolleys two workmen have to hold closed two switches. Where permanent trolleys are installed, visible signals are used which indicate whether the trolley is alive or dead. Steam plays no part in the operation of the shop except the fire pumps and this is made necessary because of a state regulation. All labor works on 8-hour shift and a 48-hour week, all work being performed in daylight except the duties of watchmen and inspectors.

Upon shopping a car for inspection, all small electric parts are removed and acid cleaned before being given to workmen; all large parts are sand blasted, and all rust and paint removed. The salt air, which is a prevailing condition in the locality where these cars operate, is particularly detrimental and causes rusting and the disintegration of paint. All fixtures, sash, doors, electric equipment and tracks are removed, dismantled and cleaned. The car body is sandblasted before washing. The car is repainted, fixtures installed; the car is then tested and released for service. In both inspection and reassembling periods, insulation and electric units are subjected to twice the normal voltage, and all air equipment is given a hydrostatic test of 25 per cent in excess of working pressure.

To discover fractures in truck frames and axles they are thoroughly sandblasted, cleaned with gaso-

Bay in which car bodies are removed and replaced on shop trucks. Motor trucks are dismantled and reassembled after necessary replacements.

line and submerged in black oil for 48 hours. The part is wiped dry and painted with whiting. The theory is that the black oil will be absorbed in any crack and disclose its presence by coloring the whiting.

The average interval between two shoppings of cars is 22 months. The non-visible parts of each car are inspected every 1200 miles flat. The visible parts are inspected at the end of each trip. It takes an average of 22 working days to put a motor car through the shop and 16 to 17 days thoroughly to overhaul a trailer. This brief description indicates the highly specialized nature of the repairs and inspection performed in the shop.

Shop Equipment

The power used is direct current at 1200 volts. There are two motors to each truck, four to a car; the motors are rated at 125 hp. and give the advantage of a 2-motor control, although there are four motors. All wires pass through grounded metal conduit, and all apparatus is grounded through an all-metal frame. This is an added safety feature. The car body and fixtures contain no combustible material.

Interior of the blacksmith shop. All departments are separated by soundproof and fireproof partitions which makes for ideal working conditions.

The machine shop equipment is, as has been mentioned, driven by individual electric motors. The heavy equipment consists of a wheel lathe, driven by a 50-hp. motor through a worm gear. The lathe will take off a ½-in. chip from the two rims on an axle, simultaneously, and the lathe cuts the bevel to the wheel automatically. Smaller equipment consists of a planer, a shaper, and lathes for turning commutators. The shop is provided with an up-to-date tool-room and a small storehouse and offices, and forms a complete and independent unit. The only line shaft in the shop is that driving emery wheels, buffers, etc.

As would be expected, all equipment about and in the shops is kept in the best of condition, clean and freshly painted. All cars as they leave the shop are,

TELLING THE SELF INTEREST STORY IN SOVIET RUSSIA

(We are apt to think of the Soviets in Russia as long-bearded, wild-eyed Bolsheviki running around with a bomb in one hand and a flaming torch in the other, but the following article which is a translation of a paper presented at the Eighth All-Russian Congress of Soviets shows that electricity is recognized as the basic industry of that country. The article appeared in "Soviet Russia," a magazine published in New York, and is presented here to show the resources of the country and the plans the Soviets have for developing them.—The Editor.)

Extracts from the paper presented by Comrade Krzyanowski at the Eighth All-Russian Congress of Soviets show that he has given considerable study to the possibilities of electrifying Russia by the development of all of her hydro-electric resources, peat bogs, coal and oil fields. While the survey is merely tentative it shows that electricity is considered "a powerful way of achieving a unification of national economy." In starting his speech M. Krzyanowski said:

"We are coming to grips with the fundamental problems of our economic life at a most difficult time. Events have proved that Russia cannot be thrown out of the circle of world economy. The problem before us is to elaborate such a plan of industry as to enable us, in a very short time, to gain a victory on the labor front similar to that gained by us on the military front; — and we have settled in a most determined manner upon the electrification of Russia. Electricity is that new force born in the old capitalist order, which places in the hands of man a mastery over the forces of nature which cannot be bound in the limits of private property. Where it is a question of forcing tremendous rivers into bounds of stone, and building powerful electric stations to serve and influence the life of huge territories; and where there is a question of uniting various territories into one economic unit, it is clear that not only private property in land, but also private property as an institution blocks the way and must be removed if we are to approach the resources of nature in accordance with the demands of technique and science.

"The regeneration of the economic life of the country in connection with the liquidation of the crisis in our food supply, transport, fuel, and labor, may be brought about in three different ways. One and the most simple is the intensification of labor. The second is the mechanization of labor, and the third is the better organization and coordination of labor on a rational basis. By establishing a comparatively small number of electric stations in the whole country, connected with one another, and forming one single network, we could unite the economy of the country into one single whole. The mere existence of such an electrical system would have as its effect a coordinated rational economy embracing the whole country. Besides this there is the possibility of utilizing as sources of energy, the refuse of industry such as

coal dust and slack, shavings of wood, etc., which under present conditions are mere waste.

"Electrification must therefore become the foundation on which the plan of our public economy must be based.

"We had in Russia before the war 45,000 small electric plants utilizing water power and representing an aggregate of one million horsepower. The number of these plants could be increased by the peasants constructing new stations in their spare time, while we could provide them with the necessary equipment. Subsequently all these stations would be included in the general state system. The industries of such a town as Petrograd, which in the past lived upon imported coal, could not be maintained and developed without electrification."

The New Electric Stations

The Commission on Electrification proposes to construct during the first period 27 stations, in such regions as would make it possible to connect the whole of Russia by one electrical system. These 27 stations will be built at most important points and will be able to cover the whole of our industry.

Quite apart from this is the plan of the electrification of the Murmansk railway, of Siberia and of Turkestan.

The outlined plan may be accomplished to a large extent by our own means, but will require an enormous amount of human labor. However, if we will obtain from abroad powerful machinery, our scheme will be realized within the next ten years.

The effects of electrification on the development of Russia will be enormous. The power developed by those stations would have the same effect as if one threw an army of 15 million fresh people on the labor front. This is true if the stations will work only eight hours a day. Working with a double shift they would develop a power substituting the energy of 30 million people.

* * *

M. Krzyzanowski demonstrated his scheme on a huge map suspended from the ceiling of the stage of the Great Theater, on which were marked in red circles the stations to be erected, and in blue those in existence. At the mention of a station by M. Krzyzanowski it was immediately lit up on the map by a little electric lamp.

In another article in the same magazine a chapter is reproduced from "Wirtschafte organisation Sowjetrusslands" by Dr. Alfons Goldschmidt which is a study of the economic conditions in Russia at the present time with particular reference to the part that electricity will play in the upbuilding of the country. He states in part:

"Three gigantic changes of location are being accomplished with the aid of electricity, with the aid of great overland power stations, with the aid of a tremendous network through which the electric current is loosed in order that everything, from the most elementary commodity down to the smallest product of skill may be given by it.

"But this transfer is not equivalent to an evacuation, a desertion of the regions. On the contrary, it is equivalent also to an intensification of the production of these regions, but it means an exploitation of other possibilities also.

"First, the economy of Russia is divided into new fields in accordance with a plan of electrification—limits are set, on the basis of a new principle—that of electrical geography. This electrical geography is the basis of all nationalization of economy. Once the new limits have been set, once economic divisions have been made in accordance with the sources of raw materials, then it will be possible also to establish rational power stations, and together with them, a practical rationing of production.

"In the Petrograd region, in the northern region, in the region evacuated by the metal industries, water power is being utilized for the production of electrical power. In the first place the falls of the rivers Svir and Volkhov. These centrals are already under construction. With their aid the transport routes, the railroads of the northern regions are to be electrified. The electrification of the Murmansk Railway is also to be undertaken soon. Great power stations are being built on the White Sea, and at Murmansk. There is excellent water power in this region, convenient sources for the production of electrical energy. Entirely new conditions for production are thus being created for the North. Great nitrogen works are there being established, also aluminum works. With artificial nitrogen, as well as with potash, it is intended to intensify agriculture in these regions. A connection by electric railway will be effected between the White Sea, Murmansk, and Petrograd. The Petrograd region will thus become an absolutely modern transportation region, with Petrograd as its central point. It has been calculated that in the region on the White Sea a million horse power (in water power) can be conveniently exploited.

"The Petrograd region will therefore obtain power stations which will serve the transportation routes to the seas and to the interior, create new industries by using the mighty water power resources, and intensify agriculture into a model economy. The electrical line from Murmansk to Petrograd will render possible the opening up of the ice-free port of Murmansk, which hitherto has been very little used.

"By means of water power and the electric current which it produces, transportation in this region will be modernized and accelerated, artificial fertilizer will be produced and immediately brought to the surrounding farm lands for purposes of intensification and agricultural training.

"But this does not exhaust the resources, the possibilities of useful yields from electrical energy in agriculture. To the east of the Urals, far into Western Siberia there exist great areas of land which are partly, in fact almost entirely untouched. This is also a question of world-wide importance. The Altai region for instance is a garden of paradise. Krzyzanowski told me that in Western Siberia 150,000,000 dessiatins of good land, are waiting for electrification, for a delving into their entrails, for a shifting about of their forces, for a unification of their forces, for illumination, for energizing by modern machines, for Americanization so to speak, for an extension, an intensive extension of cultivation.

"Americans and English have already called attention to the fact that Western Siberia is a new California.

"Western Siberia has mountain torrents, coal deposits, peat bogs. The problem of electricity from peat is approaching its solution in Russia. Accordingly great power houses are being built near the bogs. Western Siberia has all the resources of fuel. It has also great quantities of polymorphous ores and it is hoped therefore that a new metallurgical industry may arise in these regions, particularly in the environs of Krassnoyarsk.

"The electrical technology of this shifting, of this industrialization, this unification and feeding the regions with current, is the following:

"From the overland power stations, from the great central stations, the current is sent by means of transformers into the sub-stations already present or to be constructed. The small electrical works are in this way to be standardized, so to speak. They will be attached to the systems of the great central stations. For example, already all of the Moscow electrical stations have been connected with a gigantic overland power station near Moscow, the lighting plant, the tramway service of Moscow, etc. Similar is the practice with the electrical works in the metallurgical industry, in the coal industry, etc.

"In this way a great net is being spread all over Russia, consisting of regional networks that can be drawn into one. Each regional network is a tributary of a main central station from which all the sub-stations, all the power houses of the region are standardized.

"We are therefore dealing with a complete electrification of Russia which will involve a utilization of all the possibilities of electrification, of all the fuels, of peat, of coal, of coal dust, of naptha gases, etc., the utilization of hydraulic power, the utilization of existing works, the construction of branch works, of sub-stations, sub-centrals, etc.

"There is to be no better means, no more powerful way of achieving a unification of the entire national economy.

"That is why the Third Congress of Economic Soviets passed the following resolution (literal translation):

"Whereas Soviet Russia disposes of immense supplies of fuel, such as naptha, coal, peat, etc.; and likewise possesses great resources of water power in the form of water-falls, and whereas the rational utilization of these resources for the needs of the country may only be a converting them into electrical energy, the Third Congress of Economic Soviets resolves that the erection of technical power houses for the purpose of supplying industry and the cultural needs of the entire region of the Republic must be considered as one of the most important technical tasks of the nation in the near future, and instructs the Presidium of the Supreme Council of National Economy to draw up and issue concrete plans for the execution of this provision."

Electrical Maintenance of Railroad Equipment

PULLMAN

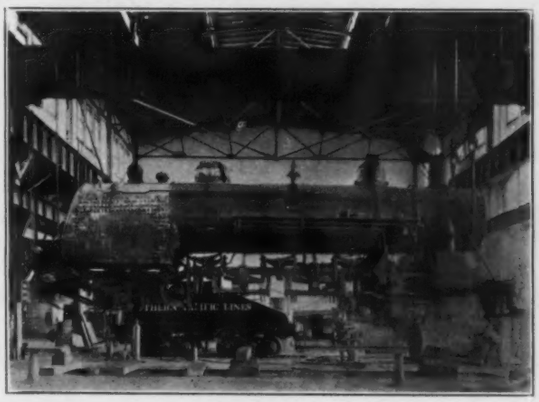
The repair shops of the Pullman Company at Richmond, California, where the cars are completely dismantled and renovated at regular intervals. The wide variety in the work involved necessitates the employment of carpenters, plumbers, upholsterers, painters, furniture makers, and many other types of workers. The shops are equipped with electrically driven machinery to handle every process.

SANTA FE

The Santa Fe yards at Richmond, California, showing the repair shops in the background. The shops, served by the Western States Gas & Electric Company, have a connected load of about 395 hp., and rank among the most completely electrically equipped railroad shops of the West. Repair work on cars and locomotives is an important factor in maintaining the efficiency of the service.

PACIFIC ELECTRIC

A machine shop department in the repair plant on the Pacific Electric Railway Company's system, at Torrance, California. Various types of drive are used, an example of individual drive being the lathe shown in the center foreground. Notice the variety of work under way and the extent of the plant and its equipment. Up-to-date facilities are essential for the rapid work required.



SOUTHERN PACIFIC

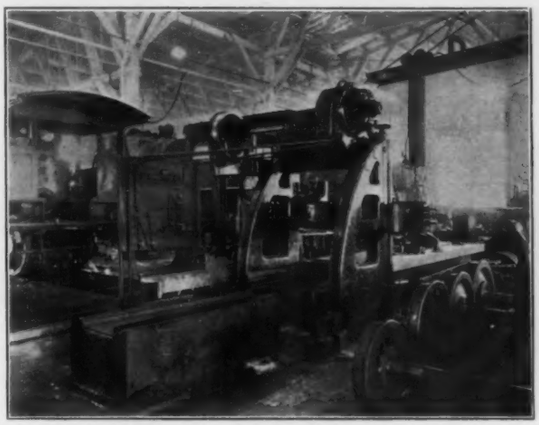
A view of work under way in the Southern Pacific shops at South San Francisco, California, showing a partially dismantled locomotive being hoisted into the air by a giant electric crane. The great weights of modern steel cars and locomotives can be effectively handled only by electrically driven machinery. Repair work is greatly facilitated by this easy handling of large bulks.

SOUTHERN PACIFIC

A corner of the South San Francisco machine shops of the Southern Pacific Railroad. Note the track in the foreground, and the detached wheel; also the motor in the background mounted above the floor level and driving the line shaft. These shops cover a large area and are completely outfitted with all the most modern electrical equipment.

SANTA FE

View showing locomotives laid up for repair in the shops of the Santa Fe Railroad at Richmond, California. Note the intensive use of electric drive in the shop, equipment for a large number of processes being concentrated at the point where it is most convenient. A drill press is shown in the foreground at the right.



CHICAGO, MILWAUKEE & ST. PAUL

A double head planer in the shops of the Chicago, Milwaukee & St. Paul Railroad at Tacoma, Washington. Electrical equipment is of course to be expected in the machine shops of this electrified railroad, but the steam roads are equally large users of electric power in repair work.

CHICAGO, MILWAUKEE & ST. PAUL

Driver wheel lathe in the Tacoma shops of the Chicago, Milwaukee & St. Paul Railroad. The large machines necessary for the complex work of maintenance as applied to railroad equipment have depended for their development and successful, uninterrupted operation, largely upon the introduction of electric drive.

Railroad Electrification for the Superpower Zone

(The demand for economies in fuel consumption and for the utmost efficiency in the generation and distribution of power, has given rise to the Superpower scheme for the Atlantic seaboard. Following is an abstract of the preliminary report on the subject which should prove of especial interest to the West, where interconnections and large-scale developments have always played a prominent part.—The Editor.)

Railroad electrification in the Superpower Zone would accomplish an annual saving of 6,000,000 tons of fuel, valued at $40,000,000 according to the preliminary report recently made by the Secretary of the Interior on the Superpower Survey of the Atlantic seaboard.

The objects of the superpower survey are stated as follows:

1. The allotment of the amount of waste in labor, coal and other materials due to the improper form of power generation and distribution within the Boston-Washington zone.

2. Recommendations regarding a regional power system by means of which these wastes may be eliminated.

The report falls into three natural divisions—physical, legal and financial, the first division being mainly devoted to the question of the power necessary to railroads, industries and utilities, and to a system of centralized electric generation and transmission to supply this power through 1930.

Electrification of Railroads

The part of the report which deals with railroads is as follows:

We find that there are twenty Class 1 railways included in the Superpower Zone. These are divided as follows: First track, 14,500 miles; second track, 6,500 miles; total trackage (including yards and sidings), 36,000 miles. There are a total of 10,000 steam locomotives, of which 44 per cent are freight, 29 per cent passenger and 27 per cent switching. The total annual railroad coal consumption for 1919 was 19,000,000 tons.

Apparently one-third of this mileage can be economically electrified, including the greater part of the double track mileage. Owing to the lack of traffic density upon the branch lines these cannot be profitably electrified. The above 33 per cent of mileage will carry more than 50 per cent of the traffic, and by preferential arrangement of routes probably 60 per cent of the total traffic could be put over this mileage. Through the electrification of the above mileage, a fuel saving of 6,000,000 tons, or $40,000,000 yearly, would be effected. Added to this saving will be $50,000,000 annually in favor of electric vs. steam engine repairs and maintenance.

The total unit cost of electrification will be approximately $40,000 per mile of main-line track, which with 12,600 miles to be electrified would cost $500,000,000. In addition yard and siding trackage would call for $300,000,000 or a total of $800,000,000. This sum will cover the necessary construction and equipment for the railways.

The electrification above outlined will displace approximately 7,000 steam locomotives, which at a salvage sale of $22,500 each will credit the electrification estimate with approximately $150,000,000, leaving a net investment of $650,000,000, which taken in connection with aforementioned savings of $90,000,000 per annum would return approximately 14 per cent on the investment.

Report on Industries

In regard to industries, the report states that there are approximately 50,000 industrial plants in the zone which either purchase or generate power. The Bureau of the Census is compiling statistics which will show the power and fuel requirements in the thirty-six major industries in plants which do not use any power, plants using only steam power, plants purchasing electric power, and plants not in any of these three classes. When the figures are complete, they will be analyzed by the staff engaged on the survey in conjunction with experts in the various industries, in order to ascertain what possible fuel savings could have been made by the Superpower System in 1919. From the data at hand a saving of between 6,000,000 tons and 8,000,000 tons of coal is indicated.

It is estimated that the new superior stations would effect a large saving of coal through the more efficient generation of power. The average rate of coal consumption for the present central station output is 2¾ lb. per kw-hr. On the Superpower System power would be produced at an average of 1¾ lb. per kw.-hr. The present output of central stations in the zone amounts to 8,000,000,000 kw-hr. of coal generated power. One pound saved per kw-hr. will conserve 4,000,000 tons of coal annually.

Outline of System

The serving of the superpower zone involves the establishment of load centers, probably about twenty, to which power will be transmitted from a distance. The location of the superpower stations and their interconnected transmission systems will be determined by the location of these load centers. Transmission at 250,000 volts is planned for distances greater than 200 miles and at 125,000 volts for service within the zone.

It is estimated that in 1930 the total power requirement in the Superpower Zone, as indicated by projected growth curves, will be 48,000,000,000 kw-hr., of which only about 25% could be supplied by water power.

Legislation and Financing

The legislation suggested by the report is an act permitting the formation of a corporation authorized to take by eminent domain lands necessary for the construction of the system. The corporation's rights of construction, maintenance and operation of power plants and transmission lines would be subject to the exercise by each state of its full police and taxing power.

The suggested plan of financing is based on the assumption that the Superpower System is an extension of present power supply systems involving a combination of several large plants with present relatively small plants to secure economy in generation, and conservation of natural resources.

The plan provides for a superpower company with non-par stock as its only class of security. A rule governing division of benefits will provide that customer companies participate equally with the stockholders in any distribution, at stated intervals, of net earnings in excess of a specified rate of return,

which itself should be more liberal than is commonly included in the idea of public regulation. To secure the participation of the ultimate consumer in this division of benefits, provision should be made that the superpower stock held by any public service company be regarded as representing an extension to its existing station capacity rather than an outside investment security.

Report of the Inman Investigating Committee

(A milestone in the history of public utility regulation is passed with the publication of the report of the Inman investigating committee, reproduced herewith. The constructive work of the Railroad Commission of California, and the standards of service maintained by the public utilities have been brought out forcefully in this report, which should do much to stabilize public opinion on these subjects.—The Editor.)

The report of the joint committee appointed by the California State Legislature which was headed by Senator J. M. Inman, to investigate the Railroad Commission of the state of California and the Public Utilities Act, has published its report of the investigation which included hearings of complaints in eight cities. In presenting the report which was signed by all the members of the committee, the following frank statement was made:

"In presenting this report your committee approaches the task with a good deal of hesitancy, knowing that upon this report much depends and that perhaps to a large extent the future policy of the state rests upon questions therein considered. And many of the preconceived ideas of members of the committee with regard to the work of the commission and of the Public Utilities Act have undergone a complete change as a result of this investigation. And it is perhaps only fair to say that it is with some degree of embarrassment that these members of the committee have been compelled to abandon their preconceived conclusions in the light of the facts that have been disclosed.

"Honesty and a desire for fair dealing, with only the best interests of the state in view, however, renders it incumbent upon those members of the committee to join without restraint or reservation in this report."

The full text of the report is given herewith, as it is believed that this report is a complete vindication of the work of the Railroad Commission and as such is sure to be of interest to all men in the public service industries of the West, and to the allied industries.

The abrogation of contracts existing at the time of the passage of the Public Utilities Act.

One of the most difficult conditions with which your committee had to deal was the abrogation of contracts between consumers and public service corporations. In numerous cases the commission made sweeping abrogations and in many instances forced consumers to accept a rate higher than that provided in their contracts. This of course was the cause of much bitterness, especially as, in many cases, the agents of the utilities insisted to their patrons that the abrogation was over their protest. And the underlying reasons for these abrogations were not understood by the consumers.

Your committee finds, however, that the theory of abrogation to prevent discriminatory and preferential rates is sound and, in fact, without applying that theory the effect of the Public Utilities Act would be to a very large extent nullified. For if we accept the theory that a public utility is entitled to a "fair return," then some consumer must pay that fair return and it seems a sound principle that ALL CONSUMERS RECEIVING THE SAME CLASS OF SERVICE SHOULD BE COMPELLED TO CONTRIBUTE ALIKE TO THAT FAIR RETURN; and while in many cases the abrogation of contracts worked a decided hardship upon individual consumers, the failure of the commission to enforce the theory would have entailed a hardship upon all other consumers.

And further, to permit one consumer to have a preferential rate, might, and doubtless would, place that consumer at a decided advantage over a consumer engaged in a like pursuit competing with him and not having that preferential rate, to the ultimate destruction of that one discriminated against. It should be apparent that, if this discrimination were permitted unchecked, a powerful concern being in a better position to enforce its demands, would by securing unfair and discriminatory rates ultimately force the smaller and weaker concerns out of the market.

In many instances consumers had paid value received in rights of way or other concessions for these favorable contracts and the consumer fails to understand that the power of the commission ends with the abrogation of the contract, that it cannot restore that which the consumer yielded for that contract, but that the question is then one for the courts alone to decide.

Your committee, without expressing any opinion, either for or against public ownership of public utilities, is of the opinion that, in the absence thereof, the only solution of this problem is through regulated monopolies. It has been laid down by Commissioner John M. Eshleman early in the life of the Public Utilities Act that "a regulated monopoly is the settled policy of the state." (Opinion and Orders, Vol. 12, page 231.)

At first glance this policy seemed radical and revolutionary but, upon closer examination, leads to the belief that the old adage "competition is the life of trade," must, along with others of our traditions, go into the discard. Competition in public utility service is fundamentally wasteful. A territory well served (conceding that regulation regulates and compels good service) by any utility, can not be better or more economically served by two or more utility concerns.

The commission has encouraged, and we think rightly so, the consolidation of utilities, especially where one is small and weak. The old theory of competition was the rendering of good service at reasonable rates under the stimulus of that competition. This is no longer necessary or advisable if we again assume that "regulation regulates."

In the past it was a common practice for a second or even more companies to invade a field already occupied and well served by a first, thereby dividing the business. Sometimes this invasion was inspired by laudable motives, but we are convinced more often by the desire or belief that the first company would be compelled to buy out the invading company, which usually resulted, and the "ultimate consumer" paid the bills. For it must be apparent that one utility can serve a given community BETTER and CHEAPER than two. At all times having in mind the fact that these are now MONOPOLIES IN NAME ONLY because of REGULATION.

Permitting municipalities to withdraw from the jurisdiction of the commission.

An amendment to the constitution is pending before this Legislature to permit municipal corporations to withdraw from the jurisdiction of the Railroad Commission, at least in so far as the fixing of rates is concerned.

Many elements enter into a fair consideration of this question.

In the first place, to permit a municipality to withdraw, might, and we think ultimately would, work a great hardship upon consumers outside municipalities. Probably one of the prime reasons for dissatisfaction and desire to withdraw (if the desire now really exists, and the committee found little if any expression of such desire) is the belief that rates have been unduly raised.

That reason alone convinces us that such withdrawal should not be permitted. For, if the municipalities were permitted to withdraw and should lower rates, and we accept the proposition that the utility company should receive a "fair return," then it becomes evident that consumers outside municipalities would be compelled to make good that reduction.

Another objection that might be logically raised against this amendment, would be the utter impossibility of the general run of municipalities being able to fix a fair return, owing to the lack of proper facilities for determining that fair return. In fixing a rate the entire properties of the utility company must be taken into consideration and a large portion of the investment is outside the municipality, in many cases. One of the most insistent complaints on the part of municipalities that has been called to our attention, is their inability to cope with the large utilities in rate making cases. How utterly impossible then would it be to fix a fair rate if left alone without the assistance of the commission and its records.

Another element that might enter into the fixing of rates by municipalities is the danger of politics entering into the question to the exclusion of fairness. If a municipal body had the question of rate making in its power, in many cases a struggle would ensue between the utility on the one hand and the consumer on the other, as to who would control that body.

And finally if we are to accept the principle of rate making as sound, then that principle should apply to all consumers alike.

The committee is convinced that rates for all consumers should be fixed by a central state body.

Activities to which should be applied the Corporations Act.

One of the most distressing and dangerous conditions found to exist and one for which there is no apparent remedy relates to certain districts where individuals or corporations sold agricultural land or town lots, agreeing to furnish water or other commodities at a very low rate, as an inducement to the purchase of that land or lot. A period of time would elapse; the land would all be sold and the seller, either through downright dishonesty or honest inability to continue that service, abandons it. In most of the instances noted the commission could not enforce an order to furnish service owing to the financial inability of the seller to respond. In many instances the cost of reproduction, maintenance and service, not taking into consideration any return whatever upon the properties, is wholly out of proportion to the value of the lands covered. As before stated in many of these distressing cases there seems to be no remedy whatever. BUT YOUR COMMITTEE DESIRES TO IMPRESS UPON THE LEGISLATURE AS STRONGLY AS POSSIBLE THE NECESSITY OF PREVENTING BY APPROPRIATE LEGISLATION THE RECURRENCE OF THESE CONDITIONS. We recommend that legislation be passed, placing under the appropriate state department, all enterprises hereafter undertaken whereby any of the commodities covered by the Public Utilities Act are agreed to be furnished, to the end that such agency shall see to it that the person promoting such enterprise shall be in a position to furnish service as agreed.

Minor Complaints

Many consumers appeared before the committee with complaints against the commission growing out of poor service, overcharges and general dealings with public service corporations and their employes.

Many of these complaints, while apparently trivial in themselves, pointed to much of the dissatisfaction found to exist. We think it only fair to say that in a large percentage of cases these complaints were found to rest upon misunderstanding, misinformation and lack of knowledge of the laws and of the policies of the commission. We think, too, that much of this dissatisfaction could be removed by the public utilities and their employes by adopting a different attitude toward their consumers. If the utilities would come to the realization that the good will of their

consumers is one of their greatest assets they would be more careful in the selection of those of their employes who come into direct contact with the public.

As to many of the other complaints coming before the committee we are of the belief that calling them to the attention of the commission will result in their immediate correction, and their specific review would be of no value in this report.

Delays and postponements.

It is apparent that delays and postponements are frequent. But in most instances these delays and postponements are unavoidable. It must be apparent where so large a number of cases are considered and such a large amount of business is transacted that delay and continuance of matters is inevitable. Much of the time covered by this report the commission was severely handicapped by depleted forces. During the war most of the engineering and other forces enlisted in the service and to a large extent did not again join the state service after their discharge.

We are of the belief that the business of the commission has been transacted, on the whole, as expeditiously as possible.

If a hearing is set for a particular day and it becomes necessary to consume two or three times the amount of time allotted to it, it at once becomes plain that other cases set for the intervening time must go over.

In the years 1919 and 1920 approximately 2447 formal cases and formal opinions and orders were issued by the commission; that during the same period approximately 5261 informal complaints have been received and acted upon and that 372 communications of general official character and letters have been received and answered daily by the commission.

So large a volume of work must necessarily entail overlapping, delay and postponement.

Regarding the raising of rates of utilities.

As your committee progressed with this work it became more and more apparent that of the several causes of dissatisfaction with the commission, at least one of the prime causes was the raise of rates allowed utilities. That this feeling should exist was inevitable, but it was just as inevitable, in our opinion, that these rates should be raised. In fact, it appears that while the cost of operation went up, the rates were kept down to the lowest level consistent with reasonable service. For instance, while the cost of oil, one of those ingredients entering most largely into the manufacture of some of the commodities, raised in price 180 per cent, and skilled labor 60 per cent, and the cost of living generally 96 per cent, the electric rate raised during a corresponding period but 36 per cent, and gas rates but 18 per cent. And while the gross revenue increased during the years from 1916 to 1919, 36 per cent, the net revenues increased but 10 per cent during a like period, and the operating expense mounted 61 per cent. And while the gross revenue of water companies increased 20 per cent during a like period, the net return was but 8½ per cent, and the operating expense increased 28 per cent.

Three years of drought during the period that other abnormal conditions prevailed was an element entering into the increase of rates.

It appeared that poor service or lack of service was as bitterly complained against as was increased cost of service. So if we concede that good service is essential, we must concede that the utilities should receive sufficient revenue to furnish that service. No one was found to contend that a utility was not entitled to a fair return.

Uniformity of fixing rates by the commission as to time.

One of the situations which appeals to your committee was that existing where municipalities were called upon to fix a budget for an ensuing period and were faced with the possibility that the rates upon public utility commodities might be raised during the time covered by that budget, thereby rendering the budget to that extent at least, and the amounts called for thereunder insufficient, and working a real hardship.

The committee can make but one suggestion, and that with some hesitancy, owing to the apparent difficulty of carrying this out. That suggestion is that the commission might fix a certain period of time for fixing rates, or stating it contrariwise, have a certain time in which rates will not be changed. Thereby the consumer would be in a position to enable him to estimate exactly what the cost of the commodity would be for a given period of time.

We repeat that there are numerous apparent difficulties to be encountered in carrying out this suggestion.

The "cost plus" fallacy in rate fixing.

Many people are of the mistaken belief that the commission fixes a rate that guarantees a certain return on the money invested regardless of the extravagance of that investment or of the cost of operations. In other words, that a condition has come about through regulation and the elimination of competition that renders the utility company extravagant and careless in the expenditure of its money. In fact, it has been openly charged that the California Railroad Commission is fixing rates on a "cost plus" basis.

Your committee finds that the facts in no wise justify such a conclusion. It is apparent that the commission cannot prevent extravagant expenditures either in construction or operating costs, but by reason of its cost data records it can and does prevent the utility company from being protected in such extravagance.

The commission does not in any sense "guarantee" anything. In fixing a rate, the commission proceeds to find the fair value of the property of the utility used and useful in the service of the public. It then puts its accountants to work analyzing and checking up the operating expense. It then fixes a fair return on the value of the property and fixes the rate accordingly. Out of that fair return must come interest on bonded indebtedness and borrowed money, amortization and losses before dividends can be paid. If the fair return happens to pay interest on the outstanding bonds and stocks of the utility, the company is fortunate. Otherwise it is unfortunate. Whether or not that fair return will pay a dividend to the stockholders or interest upon outstanding bonds is not taken into consideration by the commission.

Consequently the only too common belief that "the more a company spends the more it earns," should be completely and finally discarded. And the further belief that the commission allows dividends on "watered stock" is also without justification.

Some errors were found to have been made by the commission, but the committee is of the opinion that the commission's record in that regard is an enviable one.

Bringing the work of the commission closer to the people.

The work turned out by the commission in the past few years has been tremendous. Of their work the public has seen but the results. The means by which these results have been attained and the reasons underlying them are not so readily apparent. We are of the belief that should the people actually see the workings of the commission, much of the misunderstanding would be eliminated and a much more satisfactory feeling would result.

As the work of the committee advanced it became clear that some means must be devised to bring the people and commission into closer touch.

The average citizen views the commission with mingled feelings of awe and fear. He believes it to be an august body, sitting wrapped about with legal forms and formalities, with which he has nothing in common, and which if approached at all, must be by devious method and with reverent mien. Of course, nothing is farther from the truth, but it is a condition and not a theory with which we are faced and so your committee cast about for a possible means of bringing this most valuable state agency into closer touch with the people.

This, we are of the opinion, can only be done by bringing the commission TO THE PEOPLE. This can be accomplished by having a representative of the commission in each community. The organization of a NEW FORCE is neither desirable, nor do we believe necessary. We have now a body functioning in every community and whose work is closely allied with the work of the commission. We refer to the Department of Weights and Measures.

This department, we think, can and should be consolidated with the Railroad Commission and be placed under complete control thereof. This can be done, we believe, without in any degree lessening the splendid results achieved by the Department of Weights and Measures, and without any added costs to the state to speak of, and at the same time place within the reach of the average citizen an agent and representative of the commission, to whom he could take his complaint or suggestion without formality and with the knowledge that he would receive prompt and effective results.

This consolidation we earnestly recommend.

Appropriation for the work of the Railroad Commission.

One of the considerations coming most often and most prominently before the committee was the feeling on the part of the consumers that a fair representation of their side of the case was not had before the commission in rate making cases owing to the lack of facilities for the investigation and presentation of their case. One of the demands on the part of the consumer most frequently voiced was that the commission should have increased appropriations in order that the rights of the consumer might be more adequately protected through augmentation of the working forces of the commission. We call this matter to the attention of the Legislature in order that it may take such action as the matter seems to justify and the state of our finances permit.

In this connection many complainants coming before the committee expressed the belief that much could be gained by having an attorney or representative of the commission vigorously and openly prosecute the case of the consumer at hearings where evidence was being presented upon which rates were later to be determined. The committee was not unanimously convinced, however, that the amount of practical benefit to be derived from such procedure would be sufficient to justify the added expense, but was of the opinion that the effect of such open and vigorous prosecution, while admittedly satisfying to the consumer, would be more psychological than practical.

Recommendations.

We recommend that a standard form of contract for service be formulated by the commission and that utilities be compelled to use such general form. We further recommend that such general form of contract contain a provision in plain type showing that the rates therein set forth are subject to change by the commission at any time, anything in the contract to the contrary notwithstanding.

We recommend that all literature relating to the sale and advertising of the stocks, bonds and securities of any public service corporation or its agents be supervised by the commission and that nothing in that literature be permitted which can in any manner be construed by the public as being an endorsement or guarantee of said stocks, bonds and securities or of the rate of return thereon by said commission or the state of California.

We recommend that the commission more strictly enforce the penalties provided by the Public Utilties Act for violations of the act and of the rules and regulations of the commission and more particularly with regard to overcharges for extensions and service.

Conclusion.

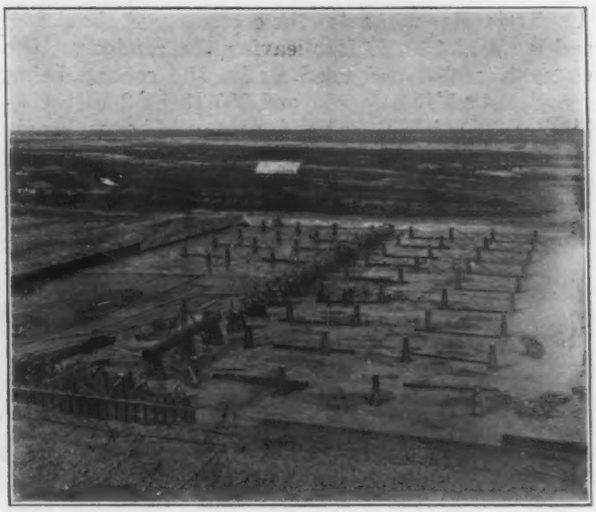
And in conclusion permit us to call attention to the fact that the public utilities are as necessary a part of our future economic development as any other agency; that they are entitled to fair treatment at the hands of the people, and to a fair and just return upon their money invested in property used and useful in the public service. That the time is rapidly approaching when our fuel oil supply will be exhausted, or so nearly so as to become prohibitive in cost, and that the development of the state depends largely upon hydroelectric energy.

That capital must be encouraged to enter that field and the only manner by which capital can be interested is to give it to understand that investments in utilities will be respected and will be permitted to earn a fair return. Otherwise, they will look for fields where they can expect such treatment. The sooner that these public service corporations and the people learn that their interests are mutual, and not antagonistic, the better off both will be.

And finally the committee earnestly commits this great law, the Public Utilities Act, to the commendation of the people. It has worked well and is working well today. Strengthen it rather than weaken it. During times such as have just passed have faith in your commission that they will be a buffer between you and the utilities, so that the people on the one hand will receive good service at a fair price, and that the utility will receive such treatment at the hands of the people that will encourage capital to come to the state and help develop our wonderful resources.

Senator J. M. INMAN, Chairman.
Senator WALTER EDEN.
Assemblyman C. W. CLEARY.
Assemblyman B. S. CRITTENDEN.
Assemblyman ISAAC JONES.

General view of the Midway plant of the San Joaquin Light & Power Corporation, showing the power house and boilers in the foreground and the operators' cottages in the background.



Cooling pond at the Midway plant. This pond is six feet deep and has a surface area of 60,000 square feet. There will be 360 brass spray nozzles, the cooling being effected by the evaporation of part of the water.

A Natural Gas Burning Steam Plant

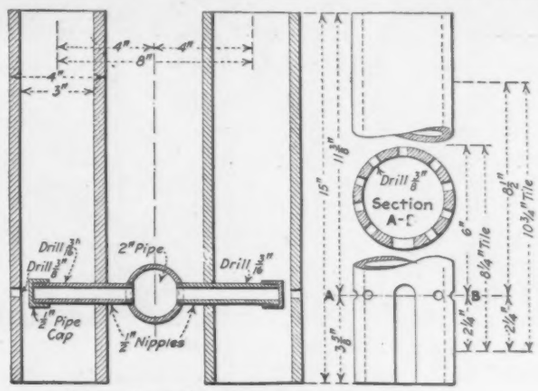
(Economies in electric power generation will be effected at the new Midway steam plant of the San Joaquin Light & Power Corporation. Located in the oil district, this plant will utilize natural gas as fuel, generating power to meet the large agricultural demands, and to compensate for hydroelectric shortage in dry years.—The Editor.)

The new Midway Steam Plant of the San Joaquin Light and Power Corporation, which is located at Button Willow, California, is being watched with great interest by western engineers. The fuel which will be used at this plant is natural gas, which comes from the Elk Hill fields and is pumped five miles through a 6-in. pipe line at a pressure of 500 lb. per sq. in., being reduced at the plant to about ½ lb. before being burned under the boilers. It is estimated that approximately one million cu. ft. of gas will be used each day.

The plans call for 8 water tube boilers of 800 hp., each set in batteries of two. The operating pressure will be at 250 lb. with the steam superheated to about 600° Fahr. These will be housed in a building 140 ft. x 128 ft. of reinforced concrete construction with swinging steel sashed windows. The same building will house the turbo-generator which will have a capacity of 12,500 kw., or 15,000 hp., the generator voltage being 11,000 volts. Before leaving the power house the current will be kept to 110,000 volts for transmission over the lines which will tie it in with the rest of the company's system.

Water Supply

The problem of an adequate water supply has been solved by wells, and tests show that the water is suitable for boiler feed purposes and no water treating plant will be necessary at the present time. Practically all of the water evaporated to steam in the boilers will be condensed and returned to the boilers, which have a capacity of about 22,500 gallons of water per hour, as hot water. The conservation of the water will be accomplished by means of a surface condenser which has 30,000 sq. ft. of cooling surface. This condenser consists of 1-in. brass tubes, 20 ft. long, approximately 6,000 tubes entering into the condenser, through which the cooling water will circulate, the steam condensing on the outside of the tubes. This makes necessary a circulation of 24,000 gallons of water per minute, which is handled by a 30-in. centrifugal pump driven by a 150 hp. steam turbine through reduction gears. Besides this material, there will be two 500 gal. per min. centrifugal boiler feed pumps for returning the condensed steam to the boiler, and one feed water heater in which the condensed steam is heated by the exhaust steam from the small turbine. A 50-ton traveling crane runs the full length of the power house and will handle all the material during construction direct from the freight cars, which will come in on a spur track running through the turbine room.



Details of gas burner

The water will enter the condenser at about 80°, and leave at 90°. After leaving the condenser, the water is cooled and used again, the cooling being accomplished by a spray pond 300 ft. by 200 ft. containing 360 brass spray nozzles. The water is sprayed six or eight feet in the air, and the cooling is accomplished by the evaporation of part of the water. It is figured that on dry hot days the water will be cooled from five to ten degrees below the temperature of the atmosphere. The cooling pond is 6 ft. deep and will act as a reservoir in case of fire. Besides this there will be a 20,000 gallon steel tank 50 ft. high, which will act as a regular supply for domestic and plant use.

It is expected that this plant will be put into operation by August of this year, and there will be real need for it on account of the increased irrigation load which this company will have.

An Emergency Hydroelectric Plant

BY GEO. H. BRAGG

(Making the most of the water supply during the 1920 power shortage induced some rapid and ingenious construction work on the Pacific Gas & Electric Company's system. The Engineer of Maintenance here describes the manner in which existing facilities were utilized to the utmost and additional power obtained.—The Editor.)

When it was foreseen that there was going to be an acute shortage of power in the state of California during the fall of 1920, and every possible source of electric energy must be made available, the Pacific Gas & Electric Company did its utmost to provide for the needs of all of its customers.

No plant was too small to be considered, even though it was rated to contribute only a few hundred kilowatts. One of the many enlisted for this cause

Spaulding Power House No. 2, walled in on two sides by steep granite bluffs and on the third by Lake Spaulding Dam.

is that called "Spaulding Power House No. 2." This development was made possible by the fact that a large quantity of water was literally being dropped through a vertical distance of approximately 150 feet from the Drum Canal to the Main South Yuba Canal to supply the Deer Creek Power House and the Nevada county industries. The flow was regulated according to a varying demand throughout the year, from a minimum of about 40 cubic feet per second to a maximum of 125 cubic feet per second, which, expressed in terms of electrical energy, represented approximately 5,000,000 kw-hr. annually.

Facilities on the Spot

There were several strong factors in favor of this one which were at the time taken into consideration. For instance: Spaulding Power House No. 1, already in operation, was so situated with respect to the site of the proposed plant that remote control was quite feasible, and the operating force already employed could give it the small amount of attention necessary to put it on the line without being handicapped in their other duties.

Furthermore, there happened to be on hand in the several districts of the company nearly all of the equipment needed, and it is a fact that the main generating unit was practically the only important piece costing real dollars.

A spillway or addit in the Drum Canal immediately below Spaulding Power House No. 1 fulfilled all the requirements of a forebay as it was properly located, and such masonry as had been already placed fitted the new plans readily. The interior was partitioned off with reinforced concrete walls and fitted with a slide gate to make the head works for the penstock.

Location of Power House

The conduit is a riveted steel pipe 239 feet long, varying in diameter from 48 inches at the top to 36 inches at the turbine gate. It is routed over the smooth steep solid granite hillside, and is supported on concrete saddles or piers uniformly spaced.

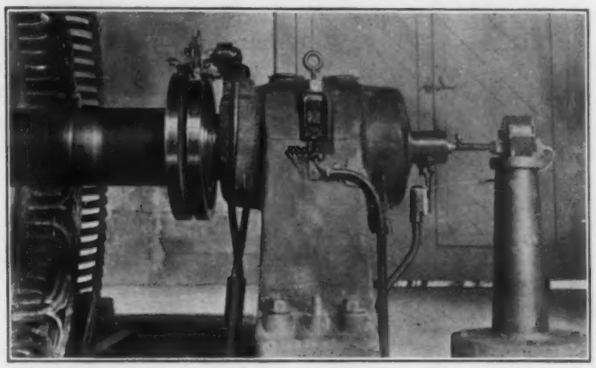
The power house is down in the gorge of the South Yuba River, walled in on two sides by the granite bluffs and on the third by a massive concrete dam towering to a height of 300 feet above, which impounds the waters of Lake Spaulding.

The building is a reinforced concrete structure measuring 32 feet long by 23 feet wide by 20 feet high. The roof is galvanized corrugated iron laid on wooden trusses. It has an exceptionally steep pitch to facilitate the sliding off of the snow. No structural steel was placed in the walls to carry the crane loads, but instead a reinforced concrete column and girder design was adopted.

Generator Equipment

The hydroelectric unit occupying the center of the floor space consists of a 1000-kva. generator, direct connected to a Francis turbine by means of a solid horizontal shaft. The entire revolving element is carried by two main bearings on each side of the revolving field, while the turbine runner overhangs one of the bearings.

The end play is limited by a marine type thrust bearing mounted on the quarter turn of the draft



End view of the hydroelectric unit, Spaulding Power House No. 2, showing the temperature relay, centrifugal switch and speed indicator generator.

tube and functions through a tall shaft bolted to the turbine runner. The lower half of the turbine scroll case has two openings just below the floor level, one connected to the penstock and the other to the relief valve.

A sudden drop in the load on the generator is accompanied by a closing of the guide vanes in the turbine and the simultaneous opening of the relief valve which discharges an equal quantity of water through its own draft tube into the afterbay, this being accomplished without varying the flow in the penstock and without causing water hammer.

The electric energy is transmitted from the generator terminals at 2300 volts by means of a three conductor lead covered cable to the oil switch in the upper power house. A common busbar connected to the oil switches of both units receives the power and conducts it to a bank of step-up transformers rated at a total capacity of 4500 kw. This was installed several years previously for No. 1, but it had a margin sufficient for the extra power from No. 2.

By a slight rearrangement the switchboard panels for each plant were consolidated, making three panels similar in appearance and simple in arrangement. An exciter unit driven by a waterwheel and induction motor was commandeered and installed at the time in the upper plant, its connections at the switchboard being so arranged that it can furnish the excitation for both units, if required.

Control Devices

The usual device for speed control in nearly all hydroelectric plants is the oil operated hydraulic governor with its auxiliaries, such as motor driven oil pumps, pressure tanks, etc. On a large system of many generating units, operating in parallel, it is not always essential that each unit be capable of governing to maintain constant speed at all loads, as this duty can best be performed by the larger plants. Every unit must however, be equipped with a device to prevent over-speed resulting from abnormal line disturbances, by closing the guide vanes in the turbine and opening the relief valve.

On the basis of the above reasoning, a spring actuated speed control mechanism was conceived, as it seemed to offer some advantages, especially that of reliability. It consists of an induction motor geared to a bronze nut that turns on a threaded stem to move the rock-shaft, thereby opening or closing the guide vanes. The connection from the stem to the lever is a toggle that opposes the expanding force of two concrete helical springs. The toggle may be tripped and the springs released by either of two devices, flyballs or a solenoid. When these exert a pressure upon a trigger, causing the links of the toggle to buckle and the springs to extend, the rock-shaft lever is shifted in the direction to close the guide vanes. An oil dash pot equipped with an adjustable orifice in the by-pass pipe governs the closing time.

When the springs have been released and the guide vanes have closed, the motor automatically starts, turns the nut, straightens the toggles and re-compresses the springs, thus resetting the mechanism for the return motion that opens the guide vanes. Upon the completion of the cycle, automatic control ceases and the remaining operations are done by manual control.

At first the guide vanes are opened only enough to bring the speed of the unit to normal for synchronizing. After the generator is paralleled they are opened farther to bring the load up to the value

The forebay, penstock and covered stairway of Spaulding Power House No. 2. A spillway in the Drum Canal immediately below Spaulding Power House No. 1 fulfilled all the requirements of a forebay.

set. It will then be found that the relief valve has closed, and that all the water is passing through the turbine; an inspection of the flow meter chart will show that the quantity of water flowing in the penstock has not varied.

One of the most important duties of an operator is to watch the temperature of the bearings, to see that they do not over-heat and burn out. The safety of valuable machinery is jeopardized if it is permit-

ted to run unattended and without adequate protection against such a contingency. There being no attendants in Spaulding Power House No. 2, the three bearings are equipped with thermometers, the bulbs of which are in contact with the babbitt metal. A temperature in excess of 90° C. will cause the fluid to expand and close an electric circuit that automatically and in proper sequence closes the guide vanes, thereby taking the water off the turbine, then opens the oil switch and finally the field switch.

In case of an insulation failure in the armature, other relays will close the electric circuit, causing the unit to be disconnected from service and duplicating the performance of the temperature relays. There are still other relays to guard against overloads of prolonged duration or short circuits in the wiring.

To aid the operator when synchronizing or putting on the load, he has before him on the switchboard, instruments to indicate the speed in revolutions per minute and guide vane openings in tenths of the maximum, both actuated by electric currents. The miniature generator mounted on a cast iron pedestal and direct connected to the main shaft by a flexible shaft furnishes the current for the speed indicator.

Over-speed is prevented normally by the fly balls driven by a belt from the main shaft, but in case the belt should break it would leave the unit without this protection. Such a contingency is met by the use of the centrifugal switch mounted on the end of the main shaft. Abnormal speed, higher in value than that for which the fly balls are set, will close an electric circuit to close the guide vanes in the turbine.

This plant has been contributing its "mite" in kilowatt-hours since November, 1920.

WHY ARE STAND-BY STEAM PLANTS NECESSARY?

BY H. L. DOOLITTLE

(The large electrical public service company must be prepared for all kinds of emergencies, including dry years, breakdowns in transmission, or any other condition which may interrupt the service. The assistant construction engineer for the Southern California Edison Company here explains the part of the steam stand-by plant on the hydroelectric system.—The Editor.)

The question is often asked, "Why is it necessary for a corporation, owning a great amount of hydroelectric power, to operate one or more steam plants in conjunction therewith?" Without giving the matter further consideration it might seem that the steam plants were entirely unnecessary, but let us look a little more carefully into the problem.

Everyone knows that the far-sighted farmer will store hay and grain in his barns and green stuff in the silo to provide feed for his stock during the months that pasturage is not obtainable. If he has a particularly large crop he might even hold over some feed to be used the next year in case the crop should fall below the average.

A corporation supplying power has to meet the same problem as the farmer. The variation in the size of crops is analogous to the variable amount of water available for hydroelectric power, as the precipitation varies greatly from year to year. It is, therefore, apparent that a water power plant designed to use the water as it naturally flows in the river will develop a larger amount of power in the winter than in the summer, and also more in wet years than in dry years. Manifestly there is no kind of commercial load that could adapt itself to such extreme fluctuations, both monthly and yearly, so it is the problem of providing a more nearly constant supply of power that the power company has to solve.

This matter can be taken care of in two ways: by the use of reservoirs for storing surplus water and by the operation of steam plants in conjunction with the water power plants. The function of the reservoir is to store up surplus water in the rainy season for use during the dry months, and, if it is practicable to construct a reservoir large enough, it might be possible to store water from a very wet year for use in a dry year. Physical conditions on most rivers are generally such that it is impossible to construct a reservoir of sufficient capacity to permit regulating the flow of water to coincide with the load requirements. It is right here that the auxiliary steam plant performs one of its most important functions.

Economizing Water Supply

By the use of a steam plant it is possible to develop water power considerably beyond the low water flow of the river, thereby making much more economical use of the water available. For example, the flow of a stream might be such that 10,000 horsepower could be generated continuously. If, however, an auxiliary steam plant is constructed to operate in conjunction with the water power plant, it might prove to be economical to install water power equipment to generate 15,000 or 20,000 horsepower. The plant could then operate at this greater capacity during the wet months of the year, and the steam plant would be operated to supply the deficit of 5,000 or 10,000 horsepower during the dry months. The situation is somewhat altered if reservoir sites are obtainable, as the water stored can then be used to a large extent in place of steam power. Even in this case the steam plant performs an important function in the case of a dry year, as it can then be operated throughout the year if necessary, to make up for the shortage of water.

Ensuring Uninterrupted Service

The steam plant also prevents interruptions to service when operated as a "stand-by" plant. That is to say, it is kept hot, ready to operate on short notice in order to pick up load that might be dropped for any cause such as trouble on the long transmission lines that are necessary with hydraulic plants. A plant on stand-by operation will consume approximately 1,000 barrels of oil per month per 10,000-kw. capacity. It is therefore seen that the importance of the load must be taken into consideration in determining whether or not this expense is justified in order to prevent comparatively short interruptions to the service.

Electrical Features of the New Pacific Mail Steamers

BY CHARLES W. GEIGER

(The growing importance of shipping in the development of the Pacific Coast has been realized in the recent assignment of new modern vessels for Oriental and East Indian service. The up-to date equipment of these ensures efficient handling of Western products, and rapid trans-Pacific passenger service.—The Editor.)

Wireless antenna and spreader on new Pacific steamers

SPECIAL care has been taken in the design and installation of the electrical equipment on the new fast combination freight and passenger steamers, "Creole State," "Wolverine State," and "Granite State," which were built by the United States Shipping Board and assigned to the Pacific Mail Steamship Company for operation in its Manila-East India service. In order to provide a comfortable temperature throughout the cabins, staterooms, public rooms, and work rooms, a most complete system of electric fans has been installed, operating in conjunction with the forced ventilating system. Each cabin and stateroom is equipped with two port holes, the electric fan being placed between them. By this means fresh air is drawn in through the port holes and circulated throughout the room. In addition, there are openings covered with gratings, near the electric fans, through which cool air is discharged into the room when the vessels pass through the tropics or at other times when the temperature is high. There are three Sturdevant electrically driven fans on the top deck for delivering air throughout the ship, and two electrically driven fans in the hold for drawing air from the cabins, staterooms, public rooms, and work rooms. Numerous fans are placed along the walls in the dining saloon, social hall, smoking room, and other public rooms.

The electric lighting system has also been given careful attention. There is an individual reading lamp at the head of every bed (there being no berths for passengers), and in each cabin and stateroom are dome lights with frosted globes, giving a soft light. At each bureau there is a wall light, with cut glass globe.

Along the deck passageways, 20-watt lights are provided. In the dining saloon, dome lights are placed in the ceiling every four feet, producing a most cheerful effect. On the writing desks there are dainty lights with a pull chain, and along the walls in the social room and in the writing room there are white candelabras. There are high power electric lights with bowl reflectors placed along the cargo rooms, flooding the decks so that work can be performed at night.

There is a fireplace in the smoking room, and another in the writing room, each equipped with logs and colored lights, designed to give the effect of an open fire. The captain's cabin is heated by an artistic electric heater installed in a fireplace.

All electric current for operating motors, and for the lighting system, is generated by a 50-kw. generator. For operating the wireless apparatus and the lighting system in case the generator should break down, two sets of 63 batteries of the Titan type have been installed in a special room adjacent to the wireless room. One set is designed for the wireless equipment and the other for the lights. Simultaneously with the breakdown of the ship's electric supply the relays operate and throw on the light batteries and the wireless batteries. These batteries are capable of operating all lights for four hours in case of emergency.

Electrical Features in the Pilot House

Practically all the electrically operated navigating instruments in the pilot house are duplicated on the flying bridge immediately above.

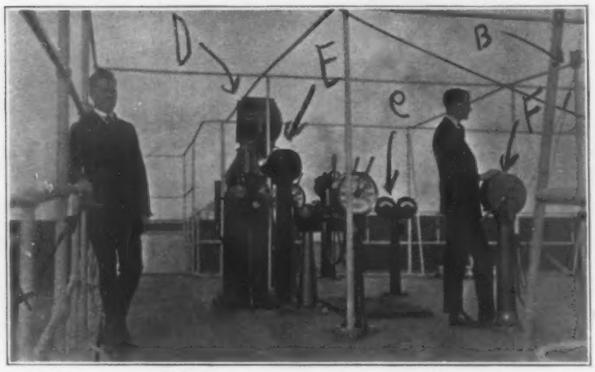
In the pilot house there are two electric engine telegraphs, and on the flying bridge, three. There is a Brown Telemotor steering gear in the pilot house and on the flying bridge. An intercommunicating telephone system of the Chas. Cory manufacture connects the wireless-room, officers cabins, pilot house, flying bridge, engine room, chart room, and captain's office. An unusual feature of this intercommunicating telephone system is the fact that a telephone is placed in the captain's berth, enabling that officer to communicate with any part of the ship, without leaving his berth. There is also a special telephone system connecting the Sperry gyro-compasses, in the pilot house and on the flying bridge, with the room in which the master gyro-wheel is located. This last-named telephone is not connected with any telephones except those near the gyro-compasses.

In the pilot house there is an electrically operated enunciator which automatically sounds an alarm bell when there is any undue rise in temperature in any cargo hold. Simultaneously with the sounding of the alarm the number of the hold in which the rise of temperature occurred is shown. There is also a system of push buttons by means of which an operator may test the system to ascertain if it is working properly. There is a general fire alarm gong in the pilot house and on the flying bridge, connected with fire bells installed throughout the ship.

On the flying bridge there is a powerful searchlight mounted on four metal supports. This has a

universal movement and can be operated from the pilot house. In the pilot house there is a submarine direction indicator.

The whistle is equipped with an electrical operating device connected with two switches in the pilot house, and with three on the flying bridge. When



Electrical devices on flying bridge of new Pacific Mail steamers. A, general fire alarm; B, Morse signal light; C, engine speed indicator; D, searchlight; E, Sperry gyro compass; F, engine telegraph.

the switch is thrown over to the left, the whistle will sound every seven seconds, and continue as long as the switch is kept in this position; when it is thrown to the right, the whistle can be operated at will. In the chart room there is a box by means of which the time between whistles may be varied, thus enabling it to be used as a fog signal.

In the pilot house is a telltale board for ship lights, push buttons for operating a call bell in the cabins of the various officers, and a switchboard for the following: Morse signal light, intercommunicating telephone, electrically operated whistle, binnacle on the flying bridge, and steering gear.

The wireless equipment consists of a 2-kw. Navy Standard spark set, having a range of approximately 2,000 miles. The set is equipped with a two step amplifier which amplifies the signals to four hundred times the original strength. There is a 30-foot caged lead-in from the antenna to the operating room. The antenna is 218 feet in length, four wires, and 90 feet above the water line.

Laundry Installation

A complete laundry has been installed, all equipment being electrically operated. A two-compartment washing machine operated by a 2-hp., 110-volt electric motor direct connected, with an automatic electric reverse, has a control device attached to a metal frame over the washer, so that no valuable working space is taken up with the electric equipment. There is a centrifugal extractor operated by a 2-hp. electric motor belt driven, the electric control being interconnected with the cover of the machine so that the extractor cannot be operated until the cover has been closed. Two 1½-hp. motors operate a dry tumbler, one driving the fan and the other the tumbler. The fan motor controls the reverse gear device for the motor driving the tumbler.

The flat work ironer is driven by a 2-hp. motor equipped with a special safety device. There is also an electrical hand ironer for the finished work. This laundry will not only take care of all the ship's work but that of the passengers as well.

Other Electrical Equipment

The electrical installations in the barber shop include electric hair clipper, vibrator, electric hair drier, electric hand iron, and an electric towel sterilizer. The electric towel sterilizer is said to be an innovation on Pacific steamers. There is also an electric fan, and ceiling and wall lights.

The hospital is equipped with a special lighting system and complete equipment for performing major operations.

The pantry and galley have been completely electrified, with electrically operated dishwasher, electric pancaker and toaster, a 5,000-watt electric broiler operating at 110 volts, an electric vegetable peeler, and an ice cream freezer of ten gallons capacity driven by an electric motor, gear drive. In the bakery there is an electric dough mixer.

Refrigerator and Storage

A novel feature of these steamers is the 1200 tons of refrigerated space for fruit. An electrical temperature reading device has been installed, by means of which the temperature in any part of any compartment can be quickly and accurately ascertained.

This refrigerated space affords a vast opportunity for Pacific Coast orchardists, vineyardists and ranchers for the disposal of any possible surplus production to the markets of the Far East.

These new liners are of special interest to farmers of California and the Pacific Coast, being specially well adapted to care for the transportation of the ranch production of the western slope. They mark the beginning of a service which provides the necessary refrigerating space for commodities that could not otherwise be sent out of the United States. The best of facilities have been provided for the handling of California fruits. Each refrigerated cargo space is equipped with two special hatches and served by a special boom and winch, assuring careful stowage.

In addition to these three steamers the Pacific Mail has been assigned five of the new "535" type, combination freight and passenger liners by the United States Shipping Board. Each of these has a displacement of 21,000 tons and a cargo capacity of eleven thousand tons, which will be handled through a complete line of eight spacious hatches.

Time between San Francisco and Manila will be cut to twenty-two days, and Calcutta will be only 34 days away from California.

ELECTRIFICATION CONSIDERED IN CHILE

It is estimated that more than one million horsepower could be developed at the Saja Falls in Chile. The many mountain streams dropping rapidly from the Andes to the Pacific would provide exceptional sources of cheap hydroelectric power, heads of a thousand feet being abundantly available. Electrification of railroads is under consideration in the district, as coal is scarce and expensive.

Prospects and How to Land Them

BY THOMAS HOWARD

(The selling of securities through employes is being encouraged by a number of western power companies, and the following extracts from a speech made recently at a meeting of the district managers of the Southern California Edison Company should prove interesting to all engaged in this and other branches of salesmanship.—The Editor.)

"There are just as good fish in the sea as ever were caught."

When a man goes fishing or hunting, what is the method of his procedure? He knows that there is game or fish to be had. First, he gets down the gun, he caresses it lovingly, he polishes it, he swabs it out, he oils it. Then he gets cartridges, he packs his grub, and he talks to anybody who will listen to him about the places to hunt, and he grows enthusiastic. He is ready and willing to walk a good many miles. For what? To bring down his game. He has an object. That is what I want to impress upon all here; that to succeed in any line of endeavor you must have an object. You must have earnestness. You must have confidence in your ability, confidence in the thing you are selling—and confidence begets earnestness; and with confidence and earnestness and the right kind of goods you will succeed.

Fishing for Prospects

There are a good many ways of developing prospects, but there is one sure way. That is, make a start. Approach someone on the subject that you are interested in, approach a dozen people, and I will guarantee that you will get enough information from the dozen to give you prospects, and so on ad infinitum. I will also tell you something else, which is this: that there is a law which is called the law of average. It may be 1 to 10, but it is sure and unfailing. It works something like this: you may call on fifteen people and make one sale, but you will surely get two out of twenty. You try it. According to your earnestness and your ability as a salesman, the average may be higher than I have mentioned. It means hard work and what we call stick-to-it-iveness, and if you do not make a sale in the first 10 or 15, stick to it. It works!

In the selling game a salesman must know something about his goods. In fact, the more he knows about them the more he can increase his average.

Now a fisherman gets out his rod and reel; he gets the right kind of hooks, and the proper kind of bait for the kind of fish he is after. How careful he is to put the bait on the hook in a manner that is inviting to the fish! Then he throws in the line. After a while he gets a nibble. How earnest he becomes! He loses it! It was a big one! Does he quit? Not if he is any kind of a fisherman. He tries again; a nibble—a bite. He lands it! How quickly he baits again! He is beginning to get interested and he stays with it. That is the thought I want to impress upon you—that you keep on throwing in your line; the fish are there. They are hungry; they will nibble; they will bite; and according to your perseverance will be your catch.

The Right Method of Approach

In soliciting prospects, the main thing to avoid is the negative answer. Frame your questions in such a way that they will require an affirmative. Do not say, "How would you like to purchase some Edison stock today?" The word "stock" is like a wet rag to a bull, to some people. I like the word "securities" better. Just assume that they ought to have some shares—something like this: "My name is Blank from the Southern California Edison Company. We are with the approval of the Railroad Commission putting before the people, a new issue of securities, bearing a very attractive rate of dividends; in fact, this is an A-1 investment bearing 8% on par or on actual investment about 8.51%." It is just like any other battle—get in the first lick if you can. Get it into his mind that it is a good thing for him. Tell him that Jones of the Bank has got a bunch of it, or any other person that is supposed to be shrewd, and finish up by inviting questions. You will find that the average person requires a little shove; in fact, we all like to be coaxed a little even if we are intending to invest. Put the personal equation to the front—they have the money and the Edison Company wants it, and if you want a thing bad enough, you will generally get it; and while the advertising that this company sends out is a mighty good thing, sometimes the idea created by this advertising lies dormant in their minds until they are approached by a representative of this company.

You have no doubt heard of "Old Scar Face," the old antlered deer that refused to be caught for many years. The old deer was stalked and hunted by experienced hunters. He had seemed to bear a charmed life. Apparently he was hit but always got away. Now, I have an "Old Scar Face" down in the Santa Ana district. I have stalked him and trailed him. I know where he gets his lunch; I have made it a point to spot him a couple of blocks away and then walk towards him. He is conscious that I am after him. He is the kind of man with whom you broach your subject and then let it soak in. I want that prospect worse than any I ever got. I got a good shot at him the other day. He stumbled; he fell; but he got away. I was talking to two prospects on the street before coming to work and "Old Scar Face" said, "When you get through I want to see you." In his quiet way he asked, "What did you say that stock paid?" Did I land him? I did not. But I am going to get him. He might just as well take the hook now as later, because, while I am potting away at other game, I am always looking for "Old Scar Face."

The Three Requirements for the Game of Selling

This game of selling requires three things: confidence, earnestness and hard work, and results will surely follow. All the world is a prospect, so I would say to you, "Go after them."

The most amusing experience that stands out in my memory in selling Edison securities was on the last active campaign. I was talking to the proprietor of a furniture store who already had some shares—and he is some booster, believe me. While we were talking he said he knew a man who he believed had some money lying idle. He called him on the phone and asked him to come down to the store. When the man came he asked the usual questions, then said he would take a few shares. I said, "All right, let's go over to the bank and you can draw your check." He replied, "No, I have the money. Wait here while I go and get it." In a few minutes he was back and when I saw what he had, over $1500 all in greenbacks, 5's, 10's, 20's and 50's, oh boy! I was so nervous I could hardly count it, and when it was rolled up I could hardly get it in my outside coat pocket. I saw him again a few days ago and he is expecting to sell a ranch; and if he does he will come through again.

In referring again to the ways of getting prospects and the methods I use, I will say, "If the mountain will not come to Mohammed, Mohammed must go to the mountain." So, on Saturday afternoon off, I borrowed a bicycle. You may know that in Santa Ana when you want to go anywhere you cannot get on a street car and ride easily to just where you want to go, as such transportation is limited. So Tommy pushes his little Ford—and sells 53 shares to five different people.

Evenings, when the fireside and evening papers are attractive, I have been making calls and getting results, or laying foundations for future results. I want to tell you now that your efforts are not altogether lost. They crop up sooner or later and your talk about your Company is good propaganda.

Things are not always pleasant, though. One evening I went out and it seemed that the harder I worked, the less I accomplished.

In conclusion let me repeat,—Confidence in yourself and in what you are selling; Earnestness in your talk as to its merits; and Hard Work in making calls —and the greatest of these is Hard Work. The fish are there, the game is there; the prospects are there. They have the money. GO GET IT!

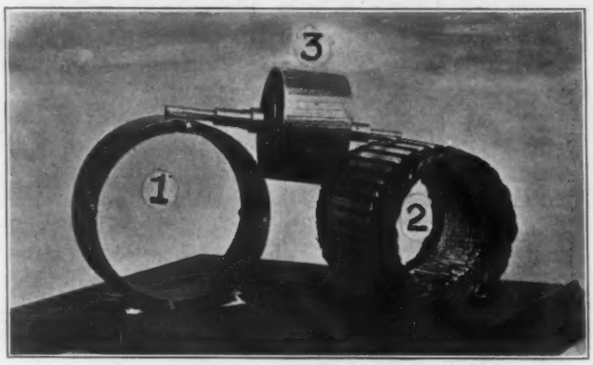
ELECTRICITY IN GAS WORKS

The use of electricity in gas works is an interesting modern development. Originally applied mainly in connection with automatic stoking machinery, coal conveyers, etc., electric motors have been extended to pumps, washers and other appliances, and it is stated that there is one gas company which uses in its works as much as a million units per year, generated on the premises. One interesting special instance of electricity proving of service to gas works is to be found in a new electrical device for measuring the flow of gas, which seems likely to enable the gas engineer to obtain detailed records of output on exactly similar lines to those obtained in an electrical supply station.

NEW METHOD OF WINDING A.C. MOTORS

BY ALEXANDER ZARKY

The problem of winding a.c. stators as easily and as compactly as d.c. armatures without losing efficiency, has been given considerable attention by members of the electrical industry. The following



Dissembled motor showing (1) the outer ring, (2) core, (3) rotor.

method of rewinding is especially applicable to fractional horsepower motors. These are always hard to handle, since it is difficult for the average hand to work in the limited space in the rotor chamber.

The new method consists of a two-core stator on the outside, a laminated ring or yoke which is fastened to the frame, and an inner ring with a laminated core and outside teeth with fully opened slots. The inner ring with its tooth core is wound similarly to the d.c. armatures,—that is, with form-wound pre-insulated coils. When completed, this has the appearance of the usual d.c. armature except that there is in the center a chamber for the rotor. A small web is left at the bottom of the teeth to keep them integral. The connections and cross leaves are all made on one end of the winding, leaving the other end free of any wires. This brings it slightly below the outside diameter of the inner core, and makes it easy to insert into the fixed outer ring. The outer periphery of the inner ring must be turned to the side for the purpose of reducing magnetic reluctance. To prevent the inner core from slipping around in the outer ring, various locking devices may be employed, such as set screws, key ways, or slitting the outer ring across its diameter.

One of the simplest and most effective ways that has been found is to taper both the inner diameter of the outer ring and the outer diameter of the inner ring to a suitable proportion (about 1 deg. taper), thus making it easy to put it in place by hand and lock firmly by applying a few blows with a soft mallet against the opposite side of the assembled motor.

To remove the inner core, a blow on the large end loosens the taper and the machine is then dissembled and the inner core removed for inspection and repair.

Campaign to Improve Standards of Lighting

BY JAMES LIGHTBODY

(Educational advertising by power companies is doing much to inform the public upon various matters pertaining to electrical development. A series devoted to better lighting, in which a special effort was made to interest the contractor-dealer, is outlined here by the publicity manager for the B. C. Electric Railway Company, Ltd.—The Editor.)

Using a series of eleven advertisements, the British Columbia Electric Railway Company, Ltd., has been conducting a campaign to educate the public to the necessity for improved lighting. A new advertisement appeared about every four days, and contractor-dealers in the territory served by the company were kept advised as to the field covered by each one and urged to cooperate with the company by clipping the advertisements, displaying them in prominent places, and following up the campaign with local window displays and other methods.

The first advertisement was entitled, "New Ideas on Lighting," and told of the part that proper lighting plays in everyday life. The second advertisement was headed "How Many Foot Candles?" and gave a simple definition of the foot-candle with a good illustration, and listed the present standards of intensity desired in public buildings, stores, show windows, offices, and various industrial plants. Article number three was devoted to glare, and the part that this plays in eye-strain and fatigue.

Article number four was devoted to the lighting of churches and public halls, and stated that the test of the lighting of an auditorium is the feeling of restfulness and the absence of eye fatigue which one experiences after being in the auditorium for some time. If there are any exposed lights within the angle of vision for any length of time, there will be annoyance and the audience will be irritated, restive and unable to listen to the speaker with full concentration. As much care should be given to the lighting of a hall as to the acoustic properties. A small expenditure on a moderate lighting fixture would be amply repaid by the increased comfort obtained.

Article number five was devoted to store lighting and showed the maximum results which follow efficient arrangement. This dealt with a description of the daylight type of lamp which should be used near the dry goods counters and other places where colors are to be matched. Article number six was devoted to show window lighting and stated a few of the simple principles which go to make a successful show window.

Article number seven was entitled "Industrial Lighting and Overhead Reduction," and stated that tests had proven that production has been increased as much as from ten to thirty per cent by proper factory illumination, and spoilage reduced twenty-five per cent by the same means. Not only has the quality of the work been improved, but the workingmen have obtained better working conditions, and accidents have been greatly reduced.

The next article, number eight, was headed "Some Principles of Industrial Lighting" and gave six main factors to be considered in choosing a general lighting, which were as follows:

1. Selection of a suitable lighting unit.
2. Selection of a suitable intensity of illumination.
3. Determination of the co-efficient of utilization; that is, the percentage of total light from the lamps effective on the works.
4. Determination of total light to be supplied by the lamps.
5. Determination of location and number of outlets.
6. Determination of size of lamp for each outlet to provide most nearly the amount of light desired.

Article number nine was given over to home lighting and took up the living room, making a plea for sufficient convenience outlets and for more lamps.

Article number ten carried through the idea of lighting the home, with special emphasis on the dining room and the bedrooms, in each case calling for more convenience outlets and sufficient fixtures for the bedrooms so that the lighting would be uniform.

Specimens of the advertising run by the B. C. Electric Railway Company to promote better lighting. The advertisements occupied a space of about 4 x 8 in. A new one appeared every three or four days.

The last of the series was given over to street lighting, and played up the fact that proper street lighting will cut down the number of accidents and increase the safety of the public.

The question of lighting enters into every department of life, and a campaign of this kind can be designed to appeal to an exceptionally large audience. For the home, the industrial plant and the city the subject of illumination is a vital one, and it should be advertised from this broad standpoint.

COPYRIGHT-NAT. ASSN. OF ELECT. CONTRACTORS & DEALERS-1919
FORM NO. 5

MATERIAL SUMMARY SHEET

JOB NO 6 NAME H. M. Sparks ADDRESS 1042 Dwight Way, B'Kly

5		4		3		2		1		TOTAL	CREDIT ON RETURNS	TOTAL	MATERIAL	#	COST	SELLING
Units	AMT	Units	AMT	Units	AMT	Units	AMT.	Units	AMT.							
						1		10				11	S.P Flush Sw. & Plates	.61	671	869
				2		7		4				13	3 Way " " "	.86	1118	1456
						9		10		19	17	2	Porc. Box Covers	.18	36	48
						1		1				2	O.B Pull Wall	1.05	210	279
						1		3		4	2	2	4" Key Wall	.87	174	226
		2		8		1		3				14	4" Keyless Wall	.84	1176	1540
				2		2		1				5	O.B. " "	.84	420	550
				12		2		1		15	3	12	Att Plugs	28	336	444
						4		18				22	Mica Fuses	.06	132	176
						10'		23'		33	10	23	Loom	.04	92	102
													Total		4365	5685

Form No. 5. Size 8 x 10. This form is used to arrange the material actually used on the job so that it can be billed in a condensed list. It makes a quick and accurate rearrangement possible. It is filed with the other data in the job envelope.

A University Course in Practical Cost Accounting

BY PAUL B. KELLY

(Do you make out bills so that both your customer and your bookkeeper can understand them? You cannot keep track of customers' accounts unless your bills are properly made out and regularly posted. This is the third article in the Standard Accounting System series being compiled by Mr. Paul Kelly, research accountant, in connection with the Extension Division of the University of California, and under the supervision of Professor Hatfield, Dean of the Faculties and Professor of Accounting.—The Editor.)

LESSON II

GATHERING THE DATA: CUSTOMERS' BILLS AND ACCOUNTS

Every dealer is, by the nature of his business, compelled to make statements for his customers, and to record charges in a "Customers' Ledger" of some description. But every dealer, almost without exception, keeps these records in a more or less inefficient way. His system usually involves duplications of work and a tremendous struggle with his regular statements of account at the close of the month. The object of this lesson is to teach the contractor-dealer the most practical and efficient method of keeping his accounts with his customers. The method is, of course, the one incorporated in the Standard Accounting System. It affords the following advantages:

1. Only one writing of the itemized statement is necessary. This feature saves time and stationery, and eliminates additional opportunities for errors.
2. It reduces to a minimum the work of sending monthly statements.
3. It provides a permanent and less bulky record that is available for quick reference.

Form No. 8, the customer's bill, is not furnished by the association. That is, however, a standard ruled sheet that you can get at any printer's. You only need to fill in a heading. It is an inexpensive, good-looking form. It is used for billing the customer for charged store sales, for billing "time and material" jobs, "contract" jobs, and other special charges. It is also used for rendering regular monthly statements of account to the customers. The contractor-dealer is urged to secure the advantage of this system by adopting it at once.

Method of Billing "Time and Material" Jobs

Lesson I explained the manner in which the cost of a "Time and Material" job for Mr. J. B. Stedman was secured. Naturally the next move is to make out Mr. Stedman's bill and to send it to him. We will assume for the present that the contractor-dealer knows how much he must charge for the labor and material used on the job to cover overhead expense and to secure a profit.

All customers' bills are made out on Form No. 8 which is shown in several illustrations. A carbon is

ACCOUNTS RECEIVABLE

NAME Mr. J. B Stedman,
ADDRESS 2635 Sixth St., B'Kly

COPYRIGHT-NAT. ASSN. OF ELECT. CONTRACTORS AND DEALERS. FORM NO. 11-A

DATE 1920	FOLIO	DEBITS	Y	DATE	FOLIO	CREDITS	BALANCE
12 31	1	122 38					122 38

Form No. 11. Size 9 x 8. This form is placed in a loose leaf binder. It serves as a statement of the condition of the customer's account and as an index to the duplicate bill file.

inserted so that it will be made in duplicate. The bill is dated for the day on which it is to be sent to the customer. The first thing to be placed on the

bill is the job number. This is a very important bit of information for it is the means by which the job envelope will be located if it is needed for reference at some future time. The dealer then lists the material which was actually used on the job. He secures this information from the slips in the job envelope. He also notes on the bill the charges for labor and inspection which he obtains from the front of the envelope. In the price column he charges prices sufficiently in advance of cost to secure the total he wishes to charge the customer.

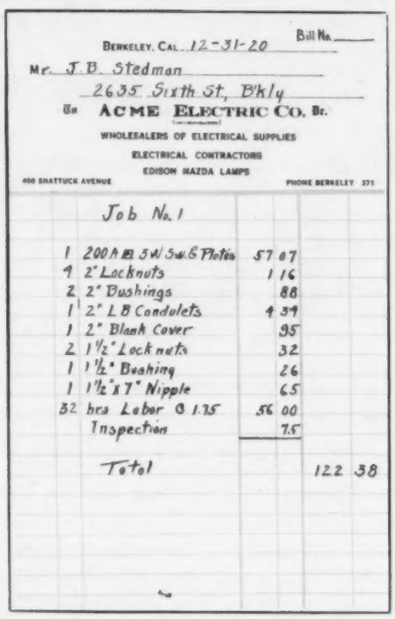
On the duplicate or carbon copy is recorded the cost of labor, material, and direct job expenses. After this is done the job envelope is filed away, and the original bill is sent to the customer at once. The duplicate is retained in the office. Study the illustrations of how the original and duplicate of the bill to Mr. J .B. Stedman were made out.

Method of Billing "Contract" Work

If work is done for a contract price the procedure is the same as that just described. The cost of the job is secured first. The bill is then rendered to the customer. This bill need not itemize the material and time used on the job, for the customer is not paying on that basis. If the work for Mr. J. B. Stedman, for ininstance, had been done for a contract price of $125, the bill would have been written to read:

"For work done at residence,
as per contract.....$125.00"

In all other respects the billing would correspond to that shown in the illustrations. The duplicate would bear the cost data. The duplicate is then perforated and placed on a file of the kind shown in the illustration.

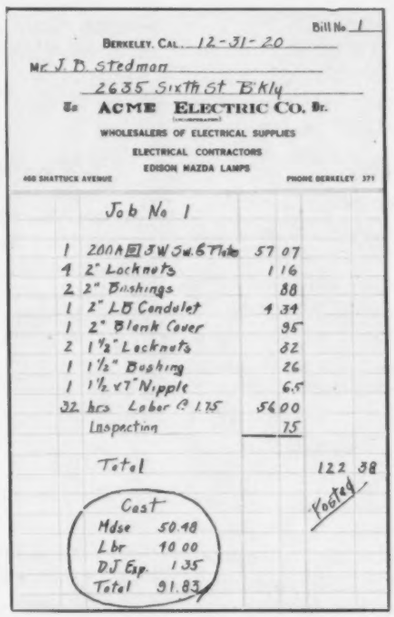


Bill No. ____
Berkeley, Cal. 12-31-20
Mr. J. B. Stedman
2635 Sixth St, B'kly
To ACME ELECTRIC CO. Dr.
WHOLESALERS OF ELECTRICAL SUPPLIES
ELECTRICAL CONTRACTORS
EDISON MAZDA LAMPS
400 SHATTUCK AVENUE PHONE BERKELEY 371

Job No. 1

1	200 A ⊡ 3W Sw. & Plates	57 07	
4	2" Locknuts	1 16	
2	2" Bushings	88	
1	2" LB Condulets	4 39	
1	2" Blank Cover	95	
2	1½" Locknuts	32	
1	1½" Bushing	26	
1	1½" x 7" Nipple	65	
32	hrs Labor @ 1.75	56 00	
	Inspection	75	
	Total		122 38

Form No. 8. Size 5⅝ x 8¼. This is the original of the customer's bill for a time and material job. It is mailed to the customer immediately after the completion of the work.



Bill No. 1
Berkeley, Cal. 12-31-20
Mr. J. B. Stedman
2635 Sixth St. B'kly
To ACME ELECTRIC CO. Dr.
WHOLESALERS OF ELECTRICAL SUPPLIES
ELECTRICAL CONTRACTORS
EDISON MAZDA LAMPS
400 SHATTUCK AVENUE PHONE BERKELEY 371

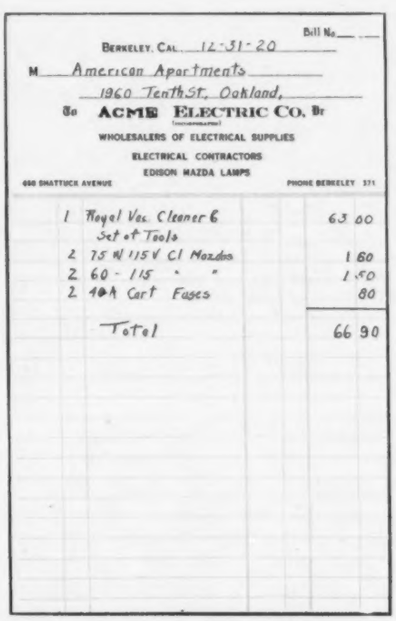
Job No 1

1	200 A ⊡ 3W Sw. & Plate	57 07	
4	2" Locknuts	1 16	
2	2" Bushings	88	
1	2" LB Condulet	4 39	
1	2" Blank Cover	95	
2	1½" Locknuts	32	
1	1½" Bushing	26	
1	1½ x 7" Nipple	65	
32	hrs Labor @ 1.75	56 00	
	Inspection	75	
	Total		122 38

Posted

Cost
Mdse 50.48
Lbr 40 00
DJ Exp 1 35
Total 91.83

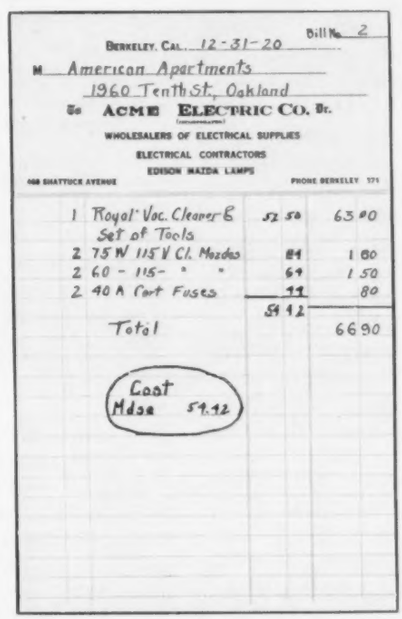
Form No. 8. Size 5⅝ x 8¼. This is the duplicate of the customer's bill for a time and material job. Note how the cost data is recorded on it. It is retained in the office.



Bill No. ____
Berkeley, Cal. 12-31-20
M American Apartments
1960 Tenth St, Oakland,
To ACME ELECTRIC CO. Dr.
WHOLESALERS OF ELECTRICAL SUPPLIES
ELECTRICAL CONTRACTORS
EDISON MAZDA LAMPS
400 SHATTUCK AVENUE PHONE BERKELEY 371

1	Royal Vac. Cleaner & Set of Tools	63 00
2	75 W 115 V Cl. Mazdas	1 60
2	60 - 115 " "	1 50
2	40 A Cart Fuses	80
	Total	66 90

Form No. 8. Size 5⅝ x 8¼. This is the original of the bill given or delivered with store sales that have been "charged." One column is left blank so that costs can be entered in it on the duplicate.



Bill No. 2
Berkeley, Cal. 12-31-20
M American Apartments
1960 Tenth St, Oakland
To ACME ELECTRIC CO. Dr.
WHOLESALERS OF ELECTRICAL SUPPLIES
ELECTRICAL CONTRACTORS
EDISON MAZDA LAMPS
400 SHATTUCK AVENUE PHONE BERKELEY 371

1	Royal Vac. Cleaner & Set of Tools	52 50	63 00
2	75 W 115 V Cl. Mazdas	84	1 60
2	60 - 115 " "	69	1 50
2	40 A Cart Fuses	11	80
		54 12	
	Total		66 90

Cost
Mdse 54.12

Form No. 8. Size 5⅝ x 8¼. This is the duplicate of the bill given to the customer for a "charged" store sale. It is retained in the office and given a bill number. Note how it is costed.

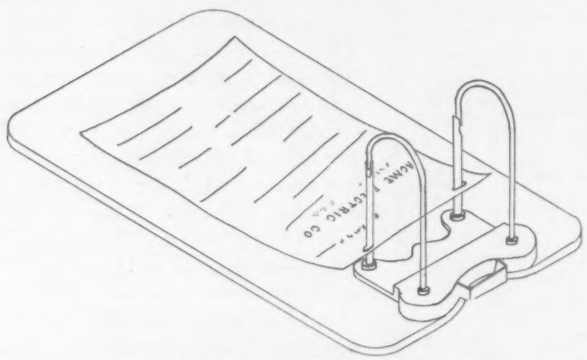
Form No. 5. Material Summary Sheet

The material summary sheet is a form devised to assist the dealer in collecting the charges for the same material drawn at different times on several requisitions. By its aid, a condensed billing can be quickly made. On this form it is necessary to write down the name of an article only once (unless there are more than 5 requisitions). Opposite the item can be indicated the date, the amount of material issued, the total issued, the amount returned, the total amount actually used, the unit cost, the total cost, and the selling price. This form is intended merely as a working sheet to be used in preparing the bill for the customer. In billing small jobs on which there are not several shipments of material its use is unnecessary. But on large jobs it is a very considerable aid. Study the filled-in form which is illustrated; its advantages are obvious. It is filed in the job envelope after it has been used to make up the customer's bill.

After the original of the

customer's bill has been given or mailed to him, the duplicates are costed as shown in the illustrations. These duplicate bills are marked in the upper right hand corner with a serial bill number. The original which went to the customer does not bear this number. The number is placed on the duplicate because it is to be filed; the number serves as the simplest means of reference.

After the bill is numbered, an account is started in the Accounts Receivable ledger under the customer's name. The Accounts Receivable ledger is a



This kind of file is used for many different forms, and is very simple and efficient. It may be hung on the wall or kept in cabinet drawers. It is obtainable at any stationery store.

loose leaf binder which is furnished as part of the Standard Accounting System; it is also sometimes called the "Customer's Ledger" or the "Sales Ledger." The accounts in this book are arranged alphabetically—according to the customer's surname. It is important that the customer's full name and complete address be placed in the heading of the ledger page so that, in the rush of mailing out many statements at the end of the month, delays will be avoided.

The date marked on the bill to the customer is placed on the ledger page under the "date" heading. In the column marked "Folio" place the number of the customer's bill. The amount of the bill is written in the "Debit" money column. On the right hand side under "Balance," the total amount this customer owes is carried forward. For instance, if he bought some merchandise at a later date, this new charge would be entered in the "Debit" column, and the total amount owed by him would be shown in the "Balance" column. Care should be taken that the amount of a bill is always entered in the "Debits" column on the left hand side of the page; a mistake of this nature is serious. The right hand or "Credits" side is for the entry of payments on account made by the customer. These payments are to be subtracted from the old "Balance" due from the customer. A complete description of how to record cash payments and enter them in the customers' ledger will be given in the next lesson.

After the amount of the bill is entered in the customers' ledger it is marked "Posted," as is shown in the illustration of the duplicate of J. B. Stedman's bill. The bills are then perforated and placed on a file of the kind shown in the illustration. The bills are filed numerically with the numbers running from bottom to top. If at a later time you wish to refer to a particular bill, you first turn to the customer's account in the ledger and obtain the bill number. The bill is then easy to find. You secure the job number from the customer's bill if you wish to refer to the job envelope also.

The use of the cost data on the duplicate will be explained in a subsequent lesson. Notice at this point, that since you gave or mailed each customer a detailed statement at the time the charge occurred, it eliminates the necessity for detailed statements at the end of the month. At this time only a brief general statement needs to be rendered. This will be dealt with in detail in the next lesson.

This course is conducted in connection with the Extension Division of the University of California, the full text being printed serially in these pages. Supplementary material to be used in connection with the course may be obtained from the University at Berkeley by application at 301 California Hall.

REPORT OF DEVELOPMENT LEAGUE HEAD

During the past year the activities of the San Francisco Electrical Development League included many things which have been of great value to the industry in that community. In his annual report E. O. Shreve, president of the organization, stated: "The true value of this league has been established —it is now without a doubt a necessity to the progress of the electrical business. It can best continue to serve by working closely with other organizations, and especially by standing back of and boosting heartily the excellent, constructive work of the California Electrical Cooperative Campaign. . . . The Electrical Development League has gotten to a place of strength and with proper thought and vision this strength can be materially increased and the activities of the league made more important through the industry. The opportunities for work of an organization such as this one are unlimited, and with a thoroughly democratic cooperative spirit, strengthened by optimism, enthusiasm and vision—and actuated by good common sense judgment—it will continue to grow to be one of the greatest live-wire constructive forces in San Francisco and in this state."

The opportunities for organizations of this type to do real constructive work in helping out the industry in various communities should not be overlooked, and every city in the West should have a similar organization. These organizations are composed of thinking men who know the possibilities and limitations of electricity, and their opinion should be asked by state legislatures and other governing bodies on matters pertaining to things electrical.

Merchandising in the Electrical Industry

BY H. C. HOPKINS

(What to sell is an important question for the retail dealer, but how to sell it is a point which is just as vital. All the elements of electrical retailing — buying, accounting, advertising, displaying, serving the customer — are here analyzed by the publicity manager for the Westinghouse Electric & Manufacturing Company in San Francisco.—The Editor.)

Within recent years the electrical industry has made remarkable progress in the development, manufacture and sale of electrical appliances. It is not so long ago that the entire activities of the industry were of an engineering character.

The rapid creation of the merchandising lines of electrical appliances found the industry without adequate machinery for proper distribution. It was natural that the first attempt at distribution should have been through the central stations, because the central stations were intensely interested in the sale of any current-consuming device, which would give them a load during the off-peak period.

Channels of Distribution

Up to this time the few contractors who were in the business were interested primarily in wiring and the installation of engineering equipment such as motors and other industrial applications of electricity. His retail sales amounted to very little, consisting largely of lamps, sockets, wiring devices and electrical novelties. Distribution at this time also tended toward the department stores, hardware stores, and drug stores, simply because their retail establishments were known, and they offered an immediate outlet for the manufacturers' new products. It was soon found, however, that these channels of distribution were largely unsatisfactory because the distributors were not familiar with electrical practice and consequently could not give the service demanded by the public.

We, in California, have long since recognized that the proper channel of distribution for the electrical merchandising line is from manufacturer to jobber, to retailer, to consumer. This arrangement insures the consumer the service of trained electrical men who are familiar with various electrical problems and are therefore able to give the advice and service demanded by the public. Through the untiring efforts of the California Electrical Cooperative Campaign, the retail branch of the electrical industry in this state has made remarkable progress toward modern merchandising methods. However, there is much work yet to be done and the efforts of the Cooperative Campaign should be supported by every man in the industry.

The growth of the electrical merchandising industry in the past few years is remarkable. In 1919 sales amounted to one billion and a half dollars, in 1920 two billion dollars, and it has been estimated that the sales for the year 1925 will reach the enormous total of ten billions of dollars. Surely no other business or industry offers the retailer such opportunity and prospect.

The manufacturer seeks to secure an adequate and permanent distribution for his merchandising products and the contractor-dealer is the natural and logical channel for such distribution. Properly to fulfil this important function, he must study, and become a merchant in the full sense of the word. The jobber must also study merchandising so as to be in a position to render service and give advice to his distributors. The jobber-salesman must equip himself so that he will be able to assist his dealer by suggestions.

Efficient Management Essential

To manage any business properly an accounting system is essential. For the electrical contractor-dealer the standard accounting system adopted by the National Association of Electrical Contractors and Dealers will be found satisfactory. This system will tell the exact condition of the business at any time, and provide an excellent system of store records. It has been estimated that 95% of electrical contractor-dealers fail within three years, due to an improper understanding of managerial problems.

Every merchant should keep a perpetual record of the stocks on hand. Such a record will tell what results are being obtained, and give warning before the stock gets out of proportion to the volume of business done. It indicates turnover and whether the rate of turnover is out of proportion to the total amount of stock carried.

We are rapidly getting back to normal and goods that were formerly hard to get will soon be available for immediate shipment from either the jobber's or the manufacturer's stock. Buying should therefore be given very careful attention. The retailer's stock must not be permitted to rise above the point where satisfactory turnover is assured; neither should it be allowed to fall below a certain point where service to his customers will be impaired. Considerations other than price may influence the buyer in his decision to purchase from a given source. The service that a local manufacturer may give him will frequently offset a decided price advantage of another manufacturer or jobber whose place of business is distant. The nearness of a local manufacturer's stock will enable the jobber or the retailer to serve his trade well with but a small quick turn in his stock in his warehouse or on his shelves. This indicates to the retailer the great advantage of a connection with a local jobber carrying adequate stock, and to the jobber the advantages of a connection with the manufacturer who studies the requirements of his jobbers and provides facilities adequate to give him good service. Therefore, a good rule to follow in buying is to buy just enough to supply your customers. By following this rule, turnover is bound to be fast.

The Importance of Turnover

Each line must be treated separately and studied individually to permit an accurate notion to be formed of whether or not it is sufficiently profitable to enable measures to be taken to improve its yield. It naturally follows that widely advertised merchandise may be more profitable to the merchant at smaller margins than unadvertised goods at higher margins. The retailer should, however, tie-in with the advertising by advertising himself to the public as a dealer in the wares referred to.

Turnover is nothing more than turn in your capital, and therefore turnover is the measure of the work each dollar in your business does for you. A good example of quick turnover is the fruit peddler seen on every street corner with his push-wagon. He puts his money into fruit every morning, sells his stock during the day and has his money back at night plus his profit. Assuming he makes 10% profit on the sale of fruit and works 26 days a month, his profits would amount to 260% on the capital invested monthly. Stock records and sales records must be kept to show the fast and slow moving lines, to guide buying and to increase turnover.

Improving the Appearance of the Store

However, the retail merchant has only begun, when he completes the improvements in his accounting and sales records. Neither accounting nor sales records will help to sell goods of themselves, valuable as may be the help they provide. The progressive merchant will consider the improvement of his store. He will consider the gradual installation of display show cases, improved and regular shelving, betterment in arrangement and appearance, improved illumination, better show windows, increased facilities for the comfort and convenience of his patrons, and so on. He will seek an improvement in the character of his selling force, requiring of them neatness, courtesy and alertness. He will give them instruction in salesmanship, care of stock, and efficient demonstrating. His advertising should keep pace with the improvements in his establishment; the progressive retailer will not only follow the publicity leads given him by the manufacturers whom he represents, but he will also advertise the service he is prepared to give through the medium of his store. After all, the retail merchant is in business to render a service to the public—the service of distribution of the goods needed by the public. This principle should be instilled in the minds of salespeople and their sales activities guided with that one thought in mind. Adequate service means adequate profits.

The importance of effective displays of merchandise is very frequently overlooked. The importance of showing goods attractively, correctly, and well price-tagged, is evidenced by the attention devoted to this phase of merchandising by the largest successful retail establishments. Any goods that can be sold through advertising can be sold through window displays if such windows are given proper thought and attention. Bad illumination will kill an otherwise good window display. The show window is probably the most valuable floor space in the retail store. The show window is the face of the retail business and indicates to the passer-by the character and class of business within. Window displays need not be elaborate or expensive to be effective. Simple displays conveying a single idea are usually the most effective.

The arrangement of merchandise within the store should receive as much attention and care as the arrangement of merchandise in the show window. The good impression created in the mind of a prospective buyer by a good window display must not be lost by a slovenly arrangement of goods within the store. Once inside the store, the customer is naturally interested in all merchandise on display, although possibly not intending to purchase more than one article. If properly displayed the merchandise may carry a message, which will bring the customer back at a later date or may cause him or her to purchase other goods besides those originally intended.

Familiarity with Stock on Hand

The merchandiser must above all know his goods. Be it an electric iron, a vacuum sweeper, or an incandescent lamp, he must be familiar with its construction, operation and application. He must be able and willing to demonstrate an appliance so that the customer will thoroughly understand its working and will thus be able to operate it without trouble, and the consequent loss of reputation of the article. Inquiries should always be made of the customer as to what application he desires to make of the lamp he wishes to purchase, and the merchandiser properly familiar with voltages, wattages, types, sizes, etc., should be ready to advise the proper lamp to meet the customer's needs.

Furthermore, the merchandiser should know his stock. He should know, for instance, where his stock of 6-lb. irons is located. He should know exactly where to place his hand upon a given size and wattage of lamp. He should also know without consulting any record, the selling price of every article which he has for sale. He should be ready to give service, and supply his customer's requirements as quickly as the clerk in a drug store who, you will find, can immediately produce the article asked for and as quickly tell you the price. Prompt attention and prompt service will bring customers back for future purchases.

Cooperation

Members of the electrical industry are pulling together for the purpose of improving conditions in all branches, and are endeavoring to understand each other's problems. Dealers are now working together instead of competing by cutthroat and unfair practices. They realize that an increased distribution of almost any product creates an increased demand for that product and their services. Each of us can assist materially by doing our part to foster this get-together spirit, thus improving the relationship between the various branches of the industry.

Our reward will lie in the betterment of the conditions under which we shall operate in the future, in the perfection of our mutual relations and in the betterment of our services to the public.

Problem Course in Electricity

BY H. H. BLISS

(The effect of electric current on various solutions is an important factor in all electrical work. In the following paper, the eighteenth of a series, some of the fundamental principles of electro-chemistry are outlined for the practical electrical man. The author is on the staff of the Riverside Junior College at Riverside, California.—The Editor.)

ELECTROLYTIC PROCESSES

Electrolysis.—Whenever current flows through a solution it divides the dissolved material into two parts, called positive and negative, which are set free from the solution at the electrodes. Atoms of hydrogen and of the metals in solution are called "ions," and they are considered to be positive since they are found to be attracted toward the cathode (negative electrode); the atoms or groups of atoms which constitute the other part of compounds are found negatively charged in solution, as these "ions" migrate to the positive electrode.

The commercial application of these facts is well illustrated in the plant of a western electrochemical company which uses current to produce two valuable

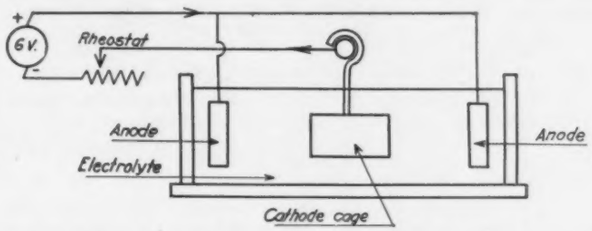


Fig. A.—Electroplating bath with two anodes. Metal cages suspended from the metal rod which forms the negative bus bar for the bath support the small articles which are to be plated.

substances by the "electrolysis" (electrical analysis) of sodium chloride (common salt). Since sodium is a metal, its ions move to the cathode and there give up their positive charges, which are neutralized by the negative electricity of the electrode. Released from the ionic condition the sodium is a very active element; it decomposes the water around the electrode and combines with part of it to form sodium hydroxide ("caustic soda" or "soda lye"). This is continually drawn off from the vat while pure brine flows in to replace it. In the meantime the chlorine of the salt, set free from its negative charges at the positive electrode, bubbles up as a gas and is caught and forced into chambers containing slaked lime, which absorbs the gas and becomes bleaching powder (usually called "chloride of lime").

Plating.—When the material in solution is a salt of an ordinary metal such as nickel, the metallic ions attach themselves to the cathode upon losing their positive charges. This action is the basis of the arts of electroplating, electrotyping, and electrolytic refining of metals.

In this work the "anode" (positive electrode) is usually made of the metal being deposited, and the anode then dissolves as rapidly as the cathode grows. Thus the "bath" is kept of uniform strength. If the positive electrode is not pure but contains a small amount of other metals, these may be kept from reaching the cathode. Thus there are produced the very pure metals known as "electrolytic copper," lead, zinc, tin, silver, gold and nickel.

When baser metals are to be plated with gold, silver or nickel, it is necessary to clean the articles thoroughly and then to send into them currents regulated in proportion to the area exposed to the solution. It is usual to plate with copper and polish this coating before plating with gold. Aluminum is first coated with zinc, then copper, then gold, for zinc sticks better to aluminum than does either of the other metals. Iron is frequently plated with zinc by the electrolytic process, "cold galvanized," instead of being dipped into melted zinc or "hot galvanized." Articles are sometimes given a coating resembling brass by plating them in a solution containing both copper and zinc salts.

A very interesting process is that of nickel plating as practiced in a California factory which has become famous for its electrical specialties. There are four stages in the work: (1) polishing the article on rapidly revolving wheels of canvas, leather or felt covered with emery powder, (2) cleaning, (3) plating, (4) buffing.

The cleaning as well as the plating is done by electrochemical action, the parts being immersed in a bath of a caustic such as soda lye to which are added liberal quantities of sodium cyanide and copper cyanide. Hydrogen gas is liberated upon the articles when they are connected to the negative terminal of a 6-volt generator, and this assists the caustic in removing every particle of dirt and grease. A thin film of copper is then found to form itself upon the surface, and the attendant uses this as a sign that the cleaning is complete.

When clean, the parts are removed to a bath containing, in each gallon of water, 32 oz. of nickel sulphate, 1 oz. of hydrofluoric acid, and 4 oz. of boric acid. (The two acids are mixed together before being added to the solution.) Current from a 6-volt generator, controlled by rheostats so as to give a voltage of from 2 to 3 volts across the terminals of the bath, is sent through the solution from nickel electrodes to the articles to be plated. If the strength of the current is made about 10 amperes for each square foot of the plated surface, a coating .0005 inch thick is formed in approximately 50 minutes. By heating the bath it is found possible to use stronger currents, up to 150 or more amperes per square foot, without "burning" (blackening) the deposit. The standard practice in this plant is to use 50 amperes per sq. ft. for about 10 minutes at a temperature of 150° Fahr.

Electrochemical Computation.—Numerous careful experiments have shown that the amount of material released from solution by electrolytic action depends both upon the strength of the current and

upon the time for which it flows. One ampere flowing for an hour will deposit .0386 oz. of nickel upon a cathode or take .0386 oz. from a nickel anode; three amperes in two hours will deposit or remove six times as much. We may say that the quantity of electricity is $3 \times 2 = 6$ "ampere-hours." As the following table shows, a different amount of each different element is released by one ampere-hour.

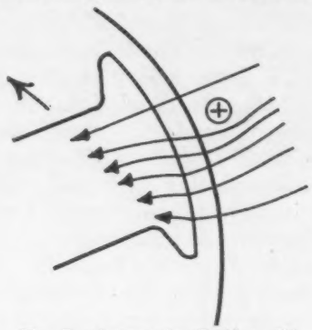


Fig. B.—Answer for Problem 196.

If copper is deposited from a solution of "cuprous chloride" it is found that each ampere-hour yields .0837 oz. of the metal, while with copper sulphate we must use twice the electricity to obtain the same amount. Gold, iron, and tin have similar characteristics, yielding different quantities of metal when different salts are used. This is due to differences in the numbers of positive charges on each ion, there being one, for instance, on the ion from cuprous chloride and two on that from copper sulphate. Hence twice as much electricity must be used in the latter case to neutralize the charges on a given number of ions.

In the table is given also the thickness in mils of a deposit produced in an hour by a current of one ampere per square foot. This figure is not given for sodium and the gases, as these do not remain upon the electrodes. It is to be noted that the oxygen and chlorine appear at the anode, while all the other elements listed are released at the cathode.

Electrochemical Table

Element	Lbs. per Cu. Ft.	Oz. per Amp-Hr.	Amp-Hrs. per oz.	Thickness *(Mils)
Aluminum	165	.0119	84.2	.054
Chlorine		.0466	21.5	
Copper	552	.0418	23.9	.057
Copper	552	.0837	12.0	.114
Gold	1207	.0865	11.6	.054
Gold	1207	.2592	3.86	.161
Hydrogen		.00132	754.0	
Iron	485	.0245	40.8	.038
Iron	485	.0367	27.2	.057
Lead	708	.1361	7.35	.144
Nickel	536	.0386	25.9	.054
Oxygen		.0105	95.0	
Silver	655	.1420	7.04	.163
Sodium	59	.0303	33.0	
Tin	455	.0391	25.6	.065
Tin	455	.0782	12.8	.129
Zinc	447	.0430	23.2	.072

*Deposit in one hour with current of one ampere per square foot.

Examples.—How long would it take to plate 5 oz. of zinc upon a sheet of iron if a current of 40 amperes is used? The fourth column indicates that 23.2 ampere-hours are required for each oz. of zinc; $5 \times 23.2 = 116$ ampere-hours. Then 40 amperes for 2.9 hours will do the work, since $40 \times 2.9 = 116$; of course the calculation is: $116/40 =$ **2.9 hours.**

At 7 amperes per sq. ft., how thick a film of aluminum can be deposited upon an object in 20 minutes? In one hour it would be $7 \times .054 = .378$ mil thick; in 1/3 hour the thickness would be $.378/3 =$ **.126 mil.**

What current would take 4 cubic inches from an iron water pipe anode in 65 hours? (Assume these ions to take the larger number of positive charges, so that the upper row of figures is used.) Since a cubic foot contains 1728 cu. in., one cu. in. weighs $485/1728 = .28$ lb. or 4.5 oz. Then to remove 4×4.5 or 18 oz. requires $18 \times 40.8 = 735$ ampere-hours; $735/65 =$ **11.3 amperes.**

Answers to Previous Problems

194. The machine must have been an over-compounded d.c. generator. Between 0 and 50 amperes the voltage rises 25 volts, or 1 volt for each 2 amperes; $36/2 = 18$ volts and therefore voltage $= 550 + 18 =$ **568 at 36 amperes.** Between 150 and 200 amperes the voltage drops 5 volts, or 1 volt for each 10 amperes. Hence at 160 amperes it is $605 - 1 =$ **604 volts.**; at 195 amperes it is $605 - 4.5 =$ **600.5 volts.** The other figures are obtained in a similar way:

Amps.	36	70	135	145	160	195
Volts	568	583	602	604	604	600.5

195. Copper loss in field = **4.4 kw.**, since the current = 20 amperes. Armature current = 1520 amperes; drop = 6.08 volts; generated e.m.f. = **226.08 volts.** Armature copper loss $= 6.08 \times 1520 = 9240$ watts = **9.24 kw.**

196. See Fig. B.

197. Amperes in line = 182; ohms $= .4 \times .0489 = .01956$; drop = 3.56 volts; hence voltage at generator = **113.56 volts.** Shunt current = 5.68 amperes, hence drop in compound field $= 187.68 \times .01 = 1.88$. Volts across brushes = **115.44.**

198. Volts = poles passed per sec. × flux per pole × inductors in series ÷ 100,000,000 $= 40 \times 4{,}000{,}000 \times 150 \div 100{,}000{,}000 =$ **240 volts.**

199. Drop in armature = $.008 \times 800 = 6.4$ volts; adding brush contact drop of 2.2 gives 8.6 volts. Hence the generated voltage $= 226.4 + 8.6 =$ **235 volts.** The diminution due to the reduction of flux by armature reaction is $240 - 235 =$ **5 volts**, or $5/240 = 2.08\%$. Hence the flux must have been reduced by 2.08% of 4,000,000 or 83,400 lines, leaving **3,916,600 lines per pole.**

200. Input to generator $= 110 \times 60 \times .70 \times .80 \times .95 = 3520$ watts. Shunt field takes 1200; stray loss $= 3520 - 1200 =$ **2320 watts.**

Problems on Electrolysis

204. What thickness of nickel is deposited upon an article in a hot plating process in which a current of 80 amperes per sq. ft. is used for 7 minutes?

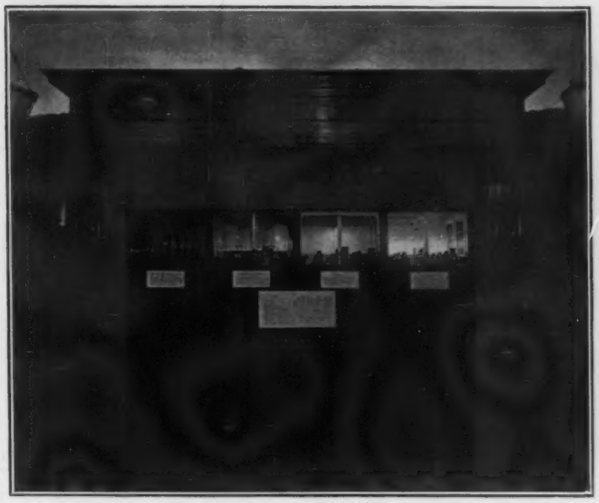
205. Using the smaller number in the table, calculate the amount of iron removed in 30 days from a water main from which a current of 35 amperes is flowing continuously into the soil.

206. How many pounds of silver can be deposited per kw-hr. in a refining process using 6-volt current?

207. Find the cost of the energy for refining 10 lbs. of silver with a 6-volt generator of 73% efficiency driven by an a.c. motor of 80% efficiency. The rate for alternating current is 3 cents per kw-hr.

208. What current is necessary to produce 200 lbs. of caustic soda (which is 57.5% sodium) in 120 hours from a salt solution? How many cubic feet of chlorine gas (weighing 3 oz. per cu. ft.) are released from the solution in the same time?

Answers to problems 201-203 will be given in next issue.



Miniature stage setting showing proper and improper methods of lighting machine shops. One of the methods adopted to point out errors in lighting to industrial men.

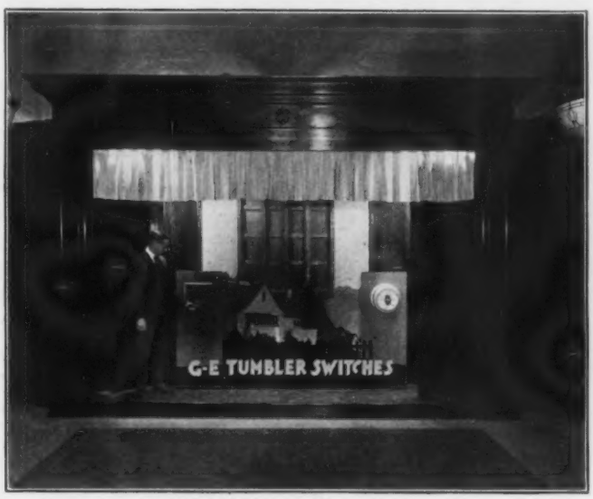
Miniature window display used to advertise variety of appliances. Attention should be given to the use of manufacturers' display cards and cartons.

G-E. Merchandising Conference

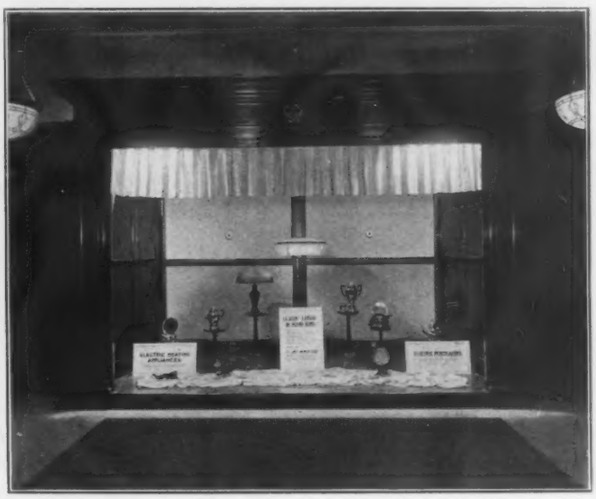
With the idea of bettering business, the Merchandising Conference of the General Electric Company which has been touring the country is scheduled to appear in the Pacific Coast territory under the auspices of the Pacific States Electric Company, beginning with Spokane on April 18th. It will be in Seattle April 20th; Portland, April 22nd; San Francisco, April 26th; Oakland, April 29th, and Los Angeles on May 3rd. The purpose is to make the conferences practical in every sense of the word, and of interest not only to members of the electrical industry who are interested in the merchandising of current consuming devices, but of value to architects, engineers, industrial men and people in all branches of industry and commerce who are in any way users of electricity.

Following a new line of procedure, the entire conference is presented on a miniature stage especially designed with a revolving floor. The upper and lower sections of its wings revolve separately and give opportunity for showing the distinction between good window displays and poor window displays, good lighting and poor lighting, and the effect of color upon various window displays. The conference is divided into an afternoon session and an evening session, and the papers which are presented by specialists in their line are sure to be of great interest to every one interested in electricity, whether from the standpoint of the electrical dealer or that of the consumer.

Elaborate plans are being made by the local offices of the General Electric Company and the Pacific States Electric Company to make this merchandising conference a success, and to bring to the attention of managers of industrial plants the many ways in which electricity can be utilized in helping them to better their business by electrical installations and better lighting.



Window display to show use of specially prepared window sets provided for the manufacturer and telling the story all by itself. This display is concentrated on selling a single idea.



Model window display of labor saving devices. Special attention should be paid to the display cards and to the balance maintained in the window display.

SPARKS—Current Facts, Figures and Fancy

(Which would you rather have—a hen or a gold mine? What is the relation between prohibition and shoe polish? These and other interesting topics such as whales, golf, raisin pies, the income tax, and irrigation are touched upon in the following collection of miscellanea from various parts of the world.—The Editor.)

A British aircraft company is endeavoring to interest whaling companies in the use of airplanes for whale-spotting.

* * *

The eggs laid by American hens exceed in value the output of all American gold and silver mines. Why go prospecting? Start an electric incubator.

* * *

Twelve glass works have been electrified in the northern portion of soviet Russia, according to recent reports on the industrial progress of the country.

* * *

According to a recent estimate, actual gold money in existence in the world this year is only two billion greater than in 1914, while paper money is forty-three and three-fourths greater, and credit currency, in the form of bank deposits subject to check, is forty-eight billions greater.

* * *

A golf club recently presented to a prominent Chicagoan has three shock absorbers, a level, a compass, a horn and electric light for "night drivers," a retrievable ball attached to a reel-wound line, and a music box. The recipient will no doubt play with the club, though it is open to question whether he will play golf with it.

* * *

A California product which is one of the few unpopular products of the state is the "short circuit" bug. This is a species of beetle which can bore through wood and alloyed substances which are harder than lead. This insect has put hundreds of telephones out of commission by boring holes in the cables and allowing the rain to enter.

* * *

The biggest of everything is California's specialty. The latest addition to the list is the world's largest raisin pie, made by the California Associated Raisin Company for exhibit purposes. The pie weighs 158 pounds, is 50 inches in diameter, and is valued at $150. Seventy-five pounds of raisins were used in making it.

* * *

Now that we have all paid our income tax we are in a condition to appreciate income tax statistics. For 1918 4,425,114 individuals filed returns in the United States, reporting aggregate net income of $16,000,000,000, income tax on which was $1,127,721,835. These figures registered a growth above 1917 of nearly 1,000,000 returns, approximately $2,273,000,000 net income, and $437,000,000 in tax paid.

Industrial alcohol production in California increased from 5,193,314 gallons in 1919 to 8,129,788 gallons in 1920. Varnish removers, refined rubber, shoe polish and celery oil depend on alcohol as a solvent; also soaps, oils, waxes, gums, shellac and essential oils. Alcohol forms the body of iodine, arnica, and benzoin.

* * *

Two million six hundred forty-eight thousand acres are now being irrigated by water from government projects. During 1919 the value of crops grown on lands within government projects was $25,000,000 greater than the total of $125,000,000 expended on all projects constructed up to the close of the last fiscal year.

* * *

Safety tools for use on electric railways using the third rail system have been a considerable problem. A successful solution has been evolved in England in the form of special tools which are divided and insulated into short sections, the sections being such that it becomes impossible to span the distance between third rail and regular rail, in an electrical sense. The strength of the insulated tools is practically that of uninsulated tools.

* * *

The Swiss electrotechnical industry occupied the fourth rank among producing countries on the international market before the war, being surpassed only by England, the United States and Germany. During the war the industry increased rapidly, and in the first half of 1920 Switzerland exported dynamos and electromotors to the value of 22 million francs; measuring instruments and meters for 5.1; other electrical apparatus for 6.5 and incandescent lamps for 2.4 millions.

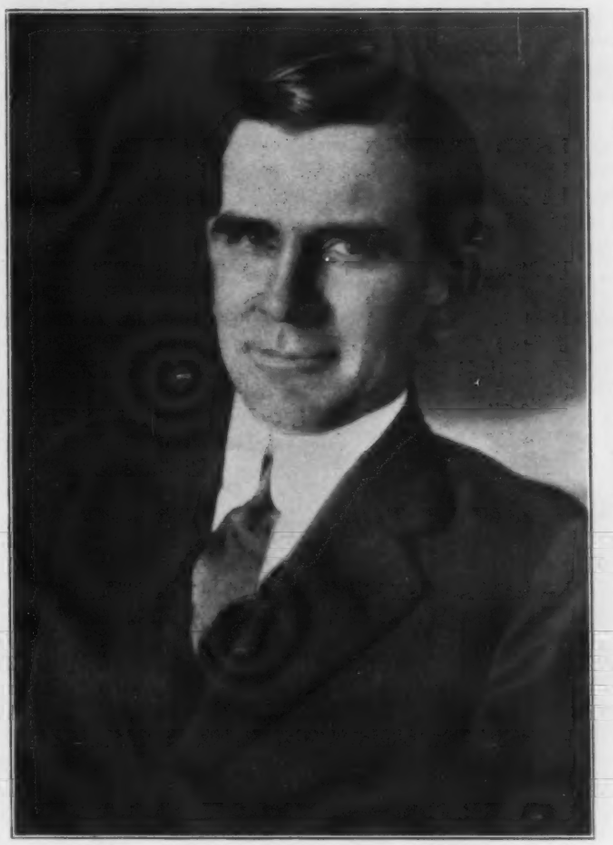
* * *

Before 1910 when Japan's use of petroleum was confined to illuminating oil, Japanese companies or refineries consumed most of their crude oil in turning over lamp oil. With the greater use of electric light, however, the consumption of lamp oil commenced to dwindle at a greater rate in all towns and districts around them. At the same time demand for gasoline began to increase partly on the greater use of motor cars and motor trucks, and partly because of the greater development of the gasoline-using industries, such as the bean oil manufacturing industry or the rubber manufacturing industry. The attention of the Japanese oil refining industry was turned to that more promising quality, and gasoline is now a more important product than lamp oil for the Japanese petroleum industry.

Builders of the West—XCVIII

IT would be an easy thing to write the life of Paul Shoup as a Sunday School thriller, the tale of a young boy who at the age of seventeen started as a mechanic in the railroad shops and who, through perseverance and application, in spite of poor health, attained the position of vice-president of a large railroad system early in his forties. Mr. Shoup is at once so much more forceful and so much more human than this sounds that it is absurd to play with the idea—and yet the incidents fit most temptingly into the chapters.

The astonishing thing is that, subtracting the melodrama, it is true—even to the extraordinary application of the man and his disregard of handicaps. Mr. Shoup is now vice-president of the Southern Pacific Company, as well as president of the Associated Oil Company and the newly organized Pacific Oil Company; he is undoubtedly one of the foremost figures in the railroad world today—achievements which may be credited to no luck of birth or accident of success, but rather to a single-handed conquering of every position he has held along the line, an extraordinary power of analysis and grasp of the full breadth of the subject in hand, and a vision of the possibilities of his work which has led him to anticipate the needs of the growing region he has served and in the truest sense to take part in the building of its achievement.



PAUL SHOUP

Vice-president of the Southern Pacific Company, whose vision of the service of transportation as the forerunner of Western agricultural and industrial development has been an important factor in the growth of this region.

He was born in 1874 at San Bernardino, California. The early advantage thus gained by being a Native Son was in part offset, however, by the inadvertence of his parents who moved to Iowa when he was three years of age, taking the small Paul with them. During the adventures of early school life, therefore, he passed as a middle westerner, but ten years later found him again in his native city fast shedding the superficial and alien culture surrounding his essentially Californian core.

In 1891 he started his railroad career in the shops of the Santa Fe Company at San Bernardino. A little later he left their employ, however, to enter that of the Southern Pacific Company, rising from ticket clerk through various executive positions in the freight and passenger departments to the post of assistant general passenger agent.

1905 found him in the San Jose district, directing railroad development in the Santa Clara Valley. The problem of freight from this region is the problem of handling the prune—and Mr. Shoup set out to become an authority on prunes. Among the reasons offered by his friends in support of his candidacy for the Hall of Fame is "The Prune Primer," a booklet of his authorship on this subject. The thoroughness with which the prune question is covered in this work is characteristic of Mr. Shoup's untiring interest in every phase of whatever problem happens to be in his hands.

Aside from this serious literary work on one of our best known breakfast foods, Mr. Shoup has from time to time adventured in other fields of writing. Indeed, he once was the winner of a short story contest held by the Black Cat Magazine, and it is on record that at one time he considered entering this field as a life work. He felt that the railroad field called for even more of his constructive imagination, however, and he decided in its favor. In 1910 he was named assistant general manager of the Southern Pacific Company in charge of electric lines, a position developing in 1912 into president of the Pacific Electric Railway Company. He also retained charge of the electric properties in Fresno, Stockton, San Jose and Oakland. The southern part of the state served by the Pacific Electric Railway was in the stage of rapid development when railroad service is of the utmost importance and to the progressive vision of Mr. Shoup is to be credited much of its phenomenal growth. When the government took over the operation of the steam railroads Mr. Shoup was made vice-president of the Southern Pacific in charge of the company's interests. In his present position he directs the financial end, fuel oil interests and electric traction.

The problem of fuel oil is a vital factor in western railroading—and true to his ability to specialize on every related phase of the transportation question, Mr. Shoup has become an authority in this field. In 1918 he was made president of the Associated Oil Company and since the first of the year, has held similar office with the new Pacific Oil Company.

Through all his career he has seen clearly the position of the railroad as an essential factor in the construction of this great western empire, and his work has been one of sharing in this common upbuilding. To Paul Shoup, therefore, as one who has been in the truest sense a builder of the West, this issue of Journal of Electricity and Western Industry is affectionately dedicated.

PERSONALS

William L. Goodwin, formerly associated with the General Electric Company, has accepted a position as assistant to the president of the Society for Electrical Development. "Bill" is only on a leave of absence from the employ of the General Electric Company, and when he has finished with the work of reorganizing the Society for Electrical Development he will return to his former position. Up until the time he left for the effete East in 1917 "Bill" Goodwin had been of the West, and his journey into the "seats of civilization" was to teach them how to quit fighting and to cooperate. Needless to say he succeeded, and he has preached his gospel from Maine to Florida and has journeyed back West occasionally to admonish the electrical industry when they seemed to have forgotten the golden rule as applied to business. Cooperation is what we need, and in the new job the West wishes the best of luck to one of its sons and knows that he will succeed.

George E. Emmons, vice-president in charge of manufacturing plants for the General Electric Company, was a recent visitor in San Francisco.

Carl Thomas, of Pasadena, California, Pacific Coast representative of Dwight T. Robinson, consulting engineers, with headquarters at New York, is a recent San Francisco visitor.

Gaskell S. Jacobs has recently announced his association with **F. Emerson Hoar** in the general practice of consulting engineering with offices in the David Hewes Building, 995 Market Street, San Francisco.

H. L. Jackson, formerly chief electrical engineer for the Three Forks Portland Cement Company, at Hanover, Mont., is now with the Southern California Edison Company, in the inspection and inventory department.

Dr. Carl L. Alsberg has been appointed one of the three directors of the Food Research Institute of Stanford University. Dr. Alsberg is now chief of the Bureau of Chemistry of the U. S. Department of Agriculture.

D. A. Bonar, formerly district agent for the California-Oregon Power Company, at Glendale, Ore., has purchased the Medford Electric Company of Medford, Ore., and will personally assume the conduct of the business.

Dana A. Scott, state director of conservation and reclamation of the state of Washington, recently announced that Marvin Chase, state hydraulic engineer, will be supervisor of hydraulics under the new state administration code.

Robert Sibley, editor of Journal of Electricty and Western Industry, and **Charles H. Delany,** assistant engineer of generation of the Pacific Gas & Electric Company, appear in an important book announcement from New York City. The second edition of the book entitled "Elements of Fuel Oil and Steam Engineering," of which these two men are the authors, has been issued from the press of the McGraw-Hill Book Company of New York. The book has been entirely rewritten in order to bring the subject matter treated down to the last word in presentation. It is about twice its former size, comprising a volume of nearly five hundred pages, with a total of over two hundred and fifty illustrations of steam electric power plant practice throughout the West where oil is used as fuel.

H. H. Schoolfield, chief engineer of the Pacific Power and Light Company, has been in New York attending the convention of the technical sections of the various Geographical Divisions of the National Electric Light Association.

C. E. Reifsteck, formerly local agent in the Lincoln Heights office of the Los Angeles district of Southern California Edison Company has been advanced to the position of assistant district manager in Pomona.

Jacob A. Kahn has been elected president of the Capital Electric Company, of Salt Lake City, succeeding H. D. Randall who was recently appointed district manager of the General Electric Company, with headquarters at Denver.

S. M. Kennedy, vice president of Southern California Edison Company was given a beautiful loving cup by the employes in Long Beach district on March 11th. **W. P. Graef,** district manager, made the presentation.

H. S. Nettleton, of Tacoma, was recently elected president of the Retail Furniture Dealers Association of Washington. Other officers are **J. E. Kelly,** Olympia, vice-president; **A. W. Wormwood,** Tacoma, secretary; **Nelson Bark,** Tacoma, treasurer.

Miles Werry, formerly superintendent of the Colgate division of the Pacific Gas & Electric Company, is now superintendent of electrical generation in the San Joaquin division, with headquarters at Sonora. **W. E. Eshaw** succeeds Miles Werry as superintendent of the Colgate division.

Thomas B. Stillman, a fuel oil expert in the Marine Department of the Babcock & Wilcox Company, is a recent San Francisco visitor, having come through the Panama Canal aboard the "Golden State." Mr. Stillman is particularly interested in the mechanical atomization of fuel oil.

Fred S. Stimson, owner of Hollywood Farms, Seattle, was recently unanimously re-elected president of the Washington State Holstein-Friesian Association, Inc. **H. C. Davis,** Yakima, is vice-president, and **R. L. Rutter,** Ellensburg, treasurer. At the Seattle meeting, held at the Frye Hotel, 14 county Holstein clubs were represented.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, is back in his office after recovering from a recent indisposition which confined him to the hospital for some two weeks. Mr. Britton experienced a collapse while testifying before the California State Legislature on the subject of the proposed tax legislation.

William B. Greeley, chief forester, United States Forest Service, with headquarters at Washington, D. C., is making a tour of the West, and was the principal speaker at the last meeting of the San Francisco Electrical Development League. Mr. Greeley graduated from the University of California with the class of 1901, and after further study at the Yale Forestry School he served in various forestry departments of the West. For a number of years he had charge of District No. 1 with headquarters at Missoula, Montana, the largest district in the United States, and there he made a name for himself in the handling of the great fires which swept that district. During the war Mr. Greeley accepted a commission as Lieutenant-Colonel and commanded the largest regiment which went overseas, doing excellent work in the reforestation of France. The West is particularly fortunate in having a man at the head of the Forestry Department who realizes the importance of hydroelectric development, and the relationship between this development and the proper care of another of our great resources.

Lloyd W. Chapman, formerly Pacific Coast editor of Chemical and Metallurgical Engineering, has been added to the editorial staff of Journal of Electricity and Western Industry with the title of Industrial Editor. In view of the ever widening influence of the Journal of Electricity in industry, Mr. Chapman's addition to the staff will mean much to the West in formulating and weighing matters of industrial importance throughout this growing section. Mr. Chapman, prior to entering editorial work, was for some years engaged in electro-chemical work for the Anaconda Copper Mining Company at Great Falls, Montana. Since that period he has had wide experience in industry throughout the West, and is today recognized as our leading authority in matters pertaining to industrial development, particularly where electro-chemical arts are involved. He is a member of the leading national engineering societies and is at present secretary of the San Francisco section of the American Chemical Society.

Glenn E. Arbogast, president of the Southern California Electrical Contractors and Dealers' Association, is a recent San Francisco visitor.

George Kidd, general manager, was elected honorary vice-president of the Canadian Electric Railway Association at its annual convention at Ottawa.

Allen E. Ransom, formerly with the Westinghouse Electric & Mfg. Co., has become Superintendent of the Olympia Light & Power Co., Olympia, Wash.

K. E. Van Kuran, Los Angeles district manager of the Westinghouse Electric & Manufacturing Company, was recently in San Francisco on a business visit.

Fred Todd, who has been in the sales department of the Pacific States Electric Company at Portland, has been transferred to the San Francisco office of the same concern.

R. H. Ballard, vice president and general manager of Southern California Edison Company, left Los Angeles March 11th for a short trip to New York and other Eastern points.

F. G. Baum, consulting engineer for the Pacific Gas & Electric Company, recently made a trip to the East in connection with the inspection of equipment for the Pit river project of that company. Mr. Baum will be particularly concerned with the working out of manufacturing details of 220-kv. insulators.

Kenneth V. Laird, electrical engineer for Gellert Engineering Company, consulting and constructing engineers, of Philadelphia, is a recent Pacific Coast visitor. Mr. Laird, it will be remembered, was for some time located on the Pacific Coast and did research work at Anaconda, Montana, after graduating from the University of California in 1914.

H. S. Sung, chief engineer of the Nantung Conservancy Bureau, and **P. L. Shen,** chief of technical experts of the Kiangsu Grand Canal of the Chinese Republic, are recent San Francisco visitors. These young Chinese engineers are on a year's inspection and investigation trip in America.

Franklin T. Griffith, president of the Portland Railway, Light & Power Company, and **Guy W. Talbot,** president of the Pacific Power & Light Company, are in Washington attending the final meeting of the Water Power Development Committee of the National Electric Light Association, of which Mr. Griffith is president, and the Federal Water Power Commission. The conference is of great importance in that it calls for the consideration of the rules and regulations under the provisions of the federal water power act.

Frederick Bachman, civil engineer representing the Swedish Government, who is touring the United States looking over engineering work now under construction, is at the present time in San Francisco. While in California he will make numerous trips to work under way, including a visit to the Hetch-Hetchy project.

Pedro Diaz, in charge of shipments in the foreign department of the Western Machinery Company of Los Angeles, has been elected to membership in the American Institute of Electrical Engineers. Mr. Diaz is a well-known electrical engineer of Mexico and has had wide experience in that republic.

William M. Moody, of the I. P. Morris Department of William Cramp & Sons Ship and Engine Building Company, with headquarters at Philadelphia, is making a thorough survey of business conditions on the Pacific Coast, particularly with a view to extending service in connection with the products of the company.

F. M. Thebo, of the firm of Thebo, Starr and Anderton, engineers and constructors, Sharon Building, San Francisco, will leave on the "Golden State" for Yokohama, Japan, on the 19th instant. Mr. Thebo will be gone for several months, during which time he will investigate, advise and organize the field forces for the engineering and construction of several large hydroelectric developments, in connection with which the above firm has been retained. The members of this firm have had a wide and extensive experience in the development and construction of such projects, and it is of particular interest to note that this is the first Pacific Coast engineering organization to be retained by the Orient on work of such character.

Harvey Ball, of Burley, Idaho, was elected president of the newly organized Southern Idaho Association of Electrical Contractors and Dealers at the first convention of the association held at Twin Falls in the latter part of February. His election was a tribute to his efforts, which have extended over a considerable period, to interest the electrical dealers of southern Idaho in the advantages to be gained through cooperation and organization. After finally securing the assistance of **Harry Deinkerlacker,** who was elected secretary-treasurer of the association, the movement gained adherents and resolved itself into the present successful organization. Prior to coming west, in 1915, Mr. Ball was connected with the Tower-Binford Electric & Manufacturing Company of Richmond, Virginia, as sales representative in the states of North and South Carolina, Virginia, and the District of Columbia. After coming west for the Montana Power Company, and traveling throughout Idaho for two years, Mr. Ball entered business for himself at Burley where he operates an electrical store and display room.

OBITUARY

Willis H. Trenner, chief engineer and superintendent of the Idaho Power Company, died in New York City March 7th. Mr. Trenner had been in New York since January on business for the company. Death was caused by pneumonia.

Mr. Trenner was a pioneer in the electrical industry in Idaho. He came to Idaho in 1908 to install an electric power plant at the DeLamar mines at Silver City. In March of the same year he became general manager of the Idaho-Oregon Power Company, and accepted a similar position with the Idaho Power Company in 1915.

Business Activities in Western Market Centers

GENERAL BUSINESS CONDITIONS

Report of the Twelfth Federal Reserve Bank concerning retail and wholesale trade in the West follows:

Retail Trade

According to reports submitted to this bank by twenty-five representative department stores and mail order houses in the Twelfth Federal Reserve District, February sales at retail in the principal cities of the district were 8.1 per cent greater by value than sales in February 1920. In the rural sections, largely due to their decreased buying power coincident with the decline in value of farm products, sales were less in amount than a year ago, offsetting the increase in the cities, and for the district as a whole retail sales were 2.4 per cent less by value than in February 1920. As the dollar will buy more commodities at present prices than it would have in February 1920, this figure does not mean that the volume of trade has been smaller. Sales totals for the first two months of this year, expressed in dollars, show a 5.9 per cent decrease compared with sales during the same period last year. Retail prices are approximately 10 to 30 per cent less than a year ago. It is probable therefore that a greater volume of merchandise has been turned over this year than last year.

The average net increase or decrease in the value of net sales for the reporting cities is as follows:

	February 1921 compared to:	
	February 1920	January 1921
Los Angeles	14.6	— 14.9
San Francisco	.4	— 7.4
Seattle	— 2.4	— 12.0
Spokane	12.2	7.3
Oakland	8.2	— 11.1
Salt Lake City	5.2	— 15.2

Wholesale Trade Report

Detailed reports from 142 representative wholesale firms in eight lines of business in this district indicate that the wholesale trade is still depressed largely due to the hesitancy of retailers to liquidate high priced inventories, taking their losses where necessary, and to restock with goods at present wholesale prices, which could be offered to the public at lower but still profitable prices. Compared with February, 1920, all lines of business show recessions in the value of net sales, but a comparison with January, 1921, shows an increase in the value of net sales of dry goods, groceries, shoes, furniture, and automobile tires.

The average net increase or decrease in the value of net sales for the eight reporting lines of business was as follows:

	February 1921 compared to:	
	February 1920	January 1921
Hardware	—35.6	—10.0
Dry Goods	—33.8	9.1
Groceries	— 4.7	4.9
Drugs	—13.6	— 4.4
Shoes	—39.8	35.0
Stationery	— 8.2	—12.2
Furniture	—35.7	41.5
Automobile Tires	—56.6	30.4

In the automobile tire and grocery trade, the majority of the reports received indicate that retailers have liquidated their high priced merchandise and are now buying for stock at new wholesale prices. In the other six lines of business the tendency is not defined, some firms reporting that liquidation is still going on, but that present buying is merely to fill in depleted stocks. Current unfilled orders are reported considerably smaller than usual.

Comment on Trend of Prices

In this district prices in general show a downward tendency except in stationery and furniture.

According to Bradstreet's index number of wholesale prices based on the prices per pound of ninety-six articles of common consumption in the United States, March 1st prices showed a decrease of 4 per cent from February 1st, and of 43.1 per cent from February, 1920.

Collections

Collections during the month were characterized as "excellent" by 2 per cent, "good" by 32 per cent, "fair" by 59 per cent and "poor" by 7 per cent of the reporting firms compared with 4, 32, 52 and 12 per cent respectively in January.

The following tables show percentage increase or decrease in sales of the 142 reporting wholesale firms during February as compared with February, 1920, and January, 1921, and for the first two months of 1921 compared with the same period in 1920, also percentage figures of collections during December, January and February.

PERCENTAGE OF INCREASE OR DECREASE (—) IN NET SALES FOR FEB. 1921 OVER JAN. 1921

	Hardware	Dry Goods	Groceries	Drugs	Shoes	Stationery	Furniture	Auto Tires
No of reporting firms	22	10	28	10	14	24	15	14
Los Angeles	—19.4		9.3	— 5.4	40.6	— 8.9	43.7	26.2
San Francisco	—10.7	8.9	9.3	— 7.3	38.9	—13.4	35.7	7.6
Seattle	— 8.7		—10.0		—12.8	— 2.1	14.9	14.7
Portland	— 6.6		— 1.1	2.4	50.0	— 3.7	54.7	
Tacoma	41.6		.40			—38.0	1.7	
Spokane	3.9		7.1			—19.0		26.8
Salt Lake City	10.9		1.2			—22.0		53.3
Sacramento	9.5		9.6					
District	—10.0	9.1	4.9	— 4.4	35.0	—12.2	41.5	30.4

SAN FRANCISCO

In general, business in the Bay district is improving, price recessions have continued particularly in foodstuffs and textiles, and this has resulted in an increase in buying of these lines. Collections are, however, slower than at any time during the past few months. Real estate transactions have been active. There is a general impression of optimism apparent, as it is felt that the crest of the wave of business depression has passed. Retail trade continues to increase as a result. Most factories continue to run on a part time basis and the number of unemployed continues to be quite large. There are well confirmed rumors of wage reductions. With the resumption of manufacturing wage rates will not be as high as in the past, and it is confidently expected that there will be employment for all later in the spring.

DENVER

Wholesale business in this district appears, from the most reliable available statistics, to be better than during the corresponding period last year, however retail trade is quiet and there is an evident tendency on the part of the buying public to wait for lower prices. Non-employment is a factor that continues to curtail demands for necessities. With the increased demand for farm labor, together with a resumption of, or increase in the operations in the mining districts, it is expected that employment will increase. Collections are reported as "improving" but are still to be considered slow. There have been no material reductions in retail prices during the past few weeks. Electrical dealers report plentiful stock of most grades of goods. Deliveries have been better than for months past.

SALT LAKE CITY

The depressed condition of the metal market and the consequent curtailment of mining operations in the intermountain section has resulted in a great deal of unemployment and has had its unfavorable effect on business in general, and particularly in those sections which are dependent upon mining activity to furnish a stimulant to business. It is expected, however, that this condition will not continue for a very long period.

Dealers in electrical appliances, in order to sell their goods, are finding it necessary to do a great deal of intensive work in the way of advertising campaigns. Conditions are such that much hard work and special inducements such as installment payments are

required to get the business.

The local hardware trade reports that business for the past two weeks has been improving. There is a growing demand for builders' hardware, and there are more construction plans to figure on in supplying that class of goods. Steel commodities, such as are staple in the spring, including netting and screens of all kinds, lawn mowers, fishing tackle, automobile accessories, are being steadily called for. The opinion obtains that were the cost of material and labor reduced, as falling prices in other lines would seem to call for, it would operate as a general incentive to construction. Collections are slow.

The lumber trade reports that the fine weather has stimulated considerable activity in the building line. There is no change in prices of lumber. Collections are fair.

In the recent decisions by the Interstate Commerce Commission Utah was the only state which won against the proposed general increase in railroad rates applying to intrastate traffic. It is estimated that this sweeping decision will save the Utah metal and coal operators $1,500,000 per annum. The decision affects practically every railroad operating in the state, particularly the Denver & Rio Grande and the Salt Lake Route. Utah operators contended that existing railroad freight rates and passenger fares within the state were much higher than those existing in neighboring states. The Federal Commission, in its decision, stated that Utah business men had made good this point and that the proposed general passenger and freight increases should not apply in Utah.

Considerable activity is noted in various districts, particularly in southern Utah, in developing the oil industry. Several rigs are now drilling, and while none of them have as yet struck oil in quantities, it is said that the prospects are exceedingly bright for a big boom in this industry in the near future. In some of the towns in the prospective oil district considerable business activity is shown, particularly in Price and Helper, where new stores are being established and the construction of several business blocks is planned.

In the agricultural districts the low price of farm products is affecting this class of business to some extent, but a spirit of optimism prevails as to the future.

LOS ANGELES

Following the peak of Income Tax payments on March 15 money for general commercial purposes seems to be more plentiful. Different sources report collections "fair to good." Business in staple lines continues satisfactory, but there is a lack of demand for the higher priced articles, which may be termed luxuries. This is particularly true in the electrical field where the wholesale trade is principally for house-wiring supplies, and such lines as are furnished operating companies for extensions. The general thought is optimistic—in fact the wave of depression has hardly been noticed in Los Angeles. Three months ago a leading banker predicted that this current would not reach Los Angeles before April or May, and now that conditions in the East are more favorable, it is doubtful if the reaction will be felt in Los Angeles to any great extent.

SEATTLE

Retail trade in Seattle during the month of March showed a considerable increase over the preceding month, although it is generally conceded the volume was less than for March of last year. Sales the latter part of the month were augmented to a noticeable extent by Easter buying. The advent of spring and a constantly increasing improvement in the employment situation is expected to greatly stimulate sales from now on.

Price cutting and clearance sales are over and the retail business now being transacted is on a stable basis.

The wholesale and jobbing trade is still quiet, although improvement is quite generally noted. As retailers will soon be obliged to replenish their stocks, further improvement and better trading is not far distant.

Collections in most lines are reported from fair to good.

Lumber mills in the Puget Sound district which have been closed down since the first of the year are gradually reopening, some with smaller crews and only on a part time basis. The shingle industry, apparently, is taking longer to recover from the slump, but a goodly number of the shingle mills are resuming.

The mills in this section were aided materially when the 7-cent reduction in lumber and shingle rates to Chicago gateway and Missouri River gateway points, sanctioned by the Interstate Commerce Commission, went into effect on March 31.

The new rates will greatly and immediately stimulate the eastward movement of lumber and shingles, is the opinion expressed by traffic officials as well as lumber and shingle manufacturers, who declare that rail shipments have virtually been at a standstill since the new rate was announced about a month ago, when eastern dealers ordered shipments suspended to await the going into effect of the new tariffs.

Though the rate reduction is not large enough to restore the relationship existing between the west coast lumber rates and the southern pine rates before the general percentage rate increase was made last August, the lumber men will accept it as progress without waiving their demands for a further reduction to restore the "lost relationship."

Puget Sound lumbermen, as a whole, state they do not expect the new rate to revive the lumber industry by any means.

The new tariffs will cut the lumber rate on fir from the North Pacific Coast points to Chicago, Peoria and St. Louis from 80 cents a hundred pounds to 73 cents, and the Omaha and Kansas City rate from 73½ cents to 66½ cents. The St. Paul and Minneapolis rate remains unchanged at 66½ cents.

Shingle rates which are higher than fir lumber rates, owing to the existence of a differential, will be reduced correspondingly. The Chicago, Peoria and St. Louis rate will be cut from 93½ cents to 86½ cents and the Omaha and Kansas City shingle rate will fall down from 86½ cents to 80 cents a hundred pounds.

Lumbermen of this section of the country cannot expect a return to normal of the lumber business to eastern points until the demand in that part of the United States exceeds the supply from the South, and the demand will not reach that point until building activities are resumed.

Seattle's domestic export trade for February, 1921, was 50,364 tons, valued at $4,134,611, or an increase of 10,232 tons over the corresponding month in 1920, according to the monthly report issued recently by Port Warden Fred M. Lathe. The total domestic and foreign import and export trade of this port during the month of February was 264,531 tons valued at $23,651,036.

PORTLAND

While many sections of the country still are adversely affected by the readjustment period following war conditions, and at a time when it requires real courage to step out boldly on new ventures, Portland and Oregon are displaying confidence in the future by undertaking features which require not only a vast amount of work but considerable capital as well, and the business men of this state and of the northwest in general are thereby showing that they believe the only way to resume business "is to resume."

The vision of Portland business men in the matter of the 1925 exposition project is being complimented far and wide. Without undue delay they have put the plan into practice by incorporating the "Atlantic-Pacific Highways and Electrical Exposition Company," capitalized at $5,000,000, to carry out the idea. Another big project that is under way is the financing of a company to take hold of the Crater Lake park resort, with the object of making it a world attraction and of exploiting its wonders as a lure to thousands of tourists. The state highway commission, busily engaged in awarding large contracts involving very large sums of money throughout the state, is another significant factor.

Wholesale and retail business in most lines, particularly in the electrical line, have shown a decline since the first of March.

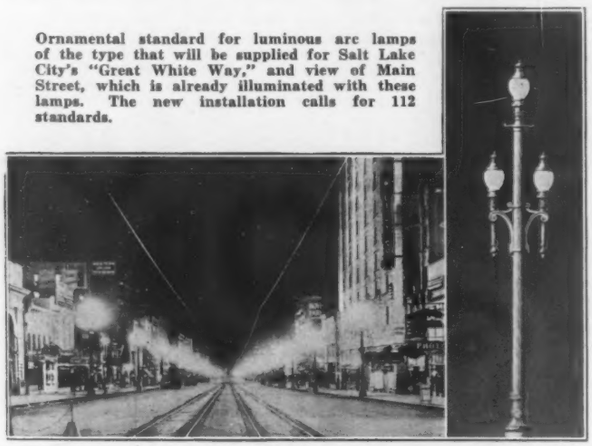
It is expected that a reduction of 7 cents a hundred pounds on lumber and shingles from the coast to Middle Western and Eastern states, effective March 31, will have a stimulating effect on the lumber industry of Oregon and Washington, which has been nearly paralyzed since the rate increases of August 25 of last year.

Resumption of operation of some of the logging camps which have been shut down all winter, the extensive road paving program, an active building campaign, and the revival of construction and business in other lines, is expected to restore the unemployment situation to normal within 60 days.

HAPPENINGS IN INDUSTRY

SALT LAKE CITY ADDS TO ITS WHITE WAY SYSTEM

A contract has just been given to the Utah Power & Light Company by Salt Lake City for an extensive addition to the city's ornamental street lighting system, which when executed it is claimed will give Salt Lake City the distinction of being the best lighted city of its size in the world.



Ornamental standard for luminous arc lamps of the type that will be supplied for Salt Lake City's "Great White Way," and view of Main Street, which is already illuminated with these lamps. The new installation calls for 112 standards.

The contract calls for 112 standards each carrying 3—6.6-amp. General Electric ornamental luminous arc lamps. The Union Metal Manufacturing Company, Canton, Ohio, will furnish the standards which will envelop the present trolley poles and carry two lamps below the trolley wire and one above. The total cost of the installation will be approximately $100,000.

Salt Lake City will now have 182 lighting standards with 546 luminous arc lamps, giving a total candle power of 819,000 on less than two miles of streets, which is approximately 90 c.p. per foot of street lighted.

The second installation is interesting proof that after three years' trial of the intensive white way, the business men of Salt Lake City have decided that it is a good investment and worthy of extension.

RESUMPTION OF LUMBER SHIPMENTS TO MIDDLE WEST EXPECTED

An early resumption of shipping of lumber to the middle west by west coast lumbermen, under a lowered rate recently announced by the railroads in Chicago, is expected. New rates apply a general reduction of 7c. per 100 lb., and while this is below the reduction sought by the west coast lumbermen, it is believed that the Northwest can now obtain considerable business in the middle west, in which territory, due to freight rates, west coast lumber has been unable to compete. The special relief granted by the Interstate Commerce Commission, hastening the effectiveness of the lowered rates, was the result of the representations by Northwest lumbermen of the seriousness of the situation with which they were confronted through the application of the last freight increase.

The former rate of 73½c. per 100 lb. for lumber to Omaha, Kansas City and other Missouri River points, will be 66½c., the same as applying to St. Paul and Minneapolis territory. To Chicago territory and points on the Mississippi River, north of East St. Louis, the rate will be 73c. instead of 80c.

ADVERTISING ORGANIZATION STANDARDS

Mr. James W. Redpath, Secretary,
Cal. State Ass'n of Elec. Contractors and Dealers.

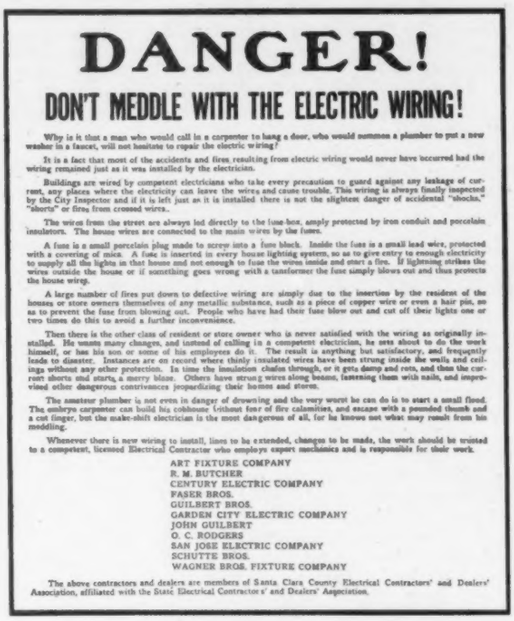
I note in January 15th issue of Journal of Electricity, page 91, notice of an advertisement which appeared in the San Jose papers by a number of San Jose contractors.

In going over this hurriedly, two thoughts occurred to me. The statement in connection with the fuse is misleading. It goes on to say "a fuse is," where as a matter of fact fuses are of so many styles and types of construction that we should not set in the consumer's mind a definite description of an article which does not always apply. This, however, is incidental to the main thought which inspired me to write you.

The closing paragraph of the ad. following the names points out that the above contractors are members of the Santa Clara County Contractors and Dealers' Association, etc. It seems to me that right here there might have been a statement outlining the principles and ethics of the contracting business for which the members stand. In other words, the story in the first part of the message seems to me to go flat unless the moral is more definitely tied in and a very definite statement as to the policy of the contractors and the principles for which they stand is also made a part of the ad. This is just given to you for what it is worth, in the hope that a future ad. might produce greater pulling power.

Very truly yours,

W. L. GOODWIN.



DANGER!

DON'T MEDDLE WITH THE ELECTRIC WIRING!

Why is it that a man who would call in a carpenter to hang a door, who would summon a plumber to put a new washer in a faucet, will not hesitate to repair the electric wiring?

It is a fact that most of the accidents and fires resulting from electric wiring would never have occurred had the wiring remained just as it was installed by the electrician.

Buildings are wired by competent electricians who take every precaution to guard against any leakage of current, any places where the electricity can leave the wires and cause trouble. This wiring is always finally inspected by the City Inspector and if it is left just as it is installed there is not the slightest danger of accidental "shocks," "shorts" or fires from crossed wires.

The wires from the street are always led directly to the fuse-box, amply protected by iron conduit and porcelain insulators. The house wires are connected to the main wires by the fuses.

A fuse is a small porcelain plug made to screw into a fuse block. Inside the fuse is a small lead wire, protected with a covering of mica. A fuse is inserted in every house lighting system, so as to give entry to enough electricity to supply all the lights in that house and not enough to fuse the wires inside and start a fire. If lightning strikes the wires outside the house or if something goes wrong with a tansformer the fuse simply blows out and thus protects the house wiring.

A large number of fires put down to defective wiring are simply due to the insertion by the resident of the houses or store owners themselves of any metallic substance, such as a piece of copper wire or even a hair pin, so as to prevent the fuse from blowing out. People who have had their fuse blow out and cut off their lights one or two times do this to avoid a further inconvenience.

Then there is the other class of resident or store owner who is never satisfied with the wiring as originally installed. He wants many changes, and instead of calling in a competent electrician, he sets about to do the work himself, or has his son or some of his employees do it. The result is anything but satisfactory, and frequently leads to disaster. Instances are on record where thinly insulated wires have been strung inside the walls and ceilings without any other protection. In time the insulation chafes through, or it gets damp and rots, and then the current shorts and starts a merry blaze. Others have strung wires along beams, fastening them with nails, and improvised other dangerous contrivances jeopardizing their homes and stores.

The amateur plumber is not even in danger of drowning and the very worst he can do is to start a small flood. The embryo carpenter can build his cobhouse without fear of fire calamities, and escape with a pounded thumb and a cut finger, but the make-shift electrician is the most dangerous of all, for he knows not what may result from his meddling.

Whenever there is new wiring to install, lines to be extended, changes to be made, the work should be trusted to a competent, licensed Electrical Contractor who employs expert mechanics and is responsible for their work.

ART FIXTURE COMPANY
R. M. BUTCHER
CENTURY ELECTRIC COMPANY
FASER BROS.
GUILBERT BROS.
GARDEN CITY ELECTRIC COMPANY
JOHN GUILBERT
O. C. RODGERS
SAN JOSE ELECTRIC COMPANY
SCHUTTE BROS.
WAGNER BROS. FIXTURE COMPANY

The above contractors and dealers are members of Santa Clara County Electrical Contractors' and Dealers' Association, affiliated with the State Electrical Contractors' and Dealers' Association.

This is the advertisement, a copy of which appeared in the January 15th issue of the Journal of Electricity, to which Mr. Goodwin refers.

PLANT ON SAN JOAQUIN RIVER IS AUTHORIZED

The Federal Power Commission has voted to grant application of the Southern California Edison Company for a 200,000-horsepower hydroelectric development of the San Joaquin river, California, being part of a $100,000,000 project contemplated by the company.

WASHINGTON COAL MINES CLOSE DOWN

Virtually all coal mines of western Washington were closed on March 16 as a result of refusal of workers to accept a 25% wage reduction. Approximately 25 mines, including several east of the Cascade Mountains, are closed, and about 2,500 men are idle. Union leaders say there is no prospect of a local settlement, and that the controversy is in the hands of national officers of the United Mine Workers at Indianapolis. The wage controversy between the operators and mine workers does not involve the Northwestern Improvement Company, operating ten big railroad coal mines in the Roslyn-Cle Elum field, and these mines are still in operation, as are also the majority of mines producing coal for the open market in that field. The operators gave the men in the commercial mines notice more than a month ago that unless the wage reductions were accepted, the mines would be forced to close. The operators urged consideration of the wage reduction proposal by the State District of the United Mine Workers, and when such consideration was not given, appealed to the miners as individuals to accept the cuts, that the mines might continue to operate. The State District officials of the miners, backed by the national officers of the United Mine Workers, took the position that the miners are working under an agreement that is part of the national agreement reached when the nation-wide coal strike was settled by the intervention of the federal government in November, 1919; that therefore no state, district or local union has power to change the wage scale, and that revision of the wage scale must be considered from a national viewpoint.

The operators state that although they have been paying the present wage scale under protest, they are bound by no agreement to pay it, and are therefore violating no contract in closing down their mines. The union insists that a written contract exists which has been broken, and that the present close-down constitutes a lockout.

UNIVERSITY EXTENSION COURSE IN THE DIESEL ENGINE

Marine engineers and others interested in mechanical engineering are registering in the course of study of the Diesel engine, which is announced by the University of California Extension Division. The class meets at 1337 Sutter street, San Francisco, on Monday and Wednesday evenings at 7:30 o'clock. Carl G. A. Rosen, of a local concern which makes Diesel engines, is the instructor in the course. The lectures will include a discussion of internal combustion engines, as applied to Diesel engines; information regarding stationary and marine Diesel engine installation, and a particular study of the various parts of the engines. Registrations are now being received.

CALIFORNIA-OREGON POWER CO. REORGANIZED

A Railroad Commission order has approved the reorganization plan of the California-Oregon Power Company. The order authorized the transfer of the properties of the company, which are located in southern Oregon and northern California, to the California-Oregon Power Company. The latter company is to issue $2,220,000 of 7% preferred stock and $4,440,000 of common stock, to be distributed to the bondholders of the original company on the basis of $500 of preferred and $1,000 of common stock for each $1,000 bond.

Through the reorganization plan submitted to the Commission the $16,225,496.75 of stocks, bonds and other indebtedness now outstanding will be reduced to $7,475,252.97.

The record in the proceedings before the Commission shows that the company has not paid bond interest since 1915, that it has been unable to make sinking fund payments required by its deed of trust, and that it is in need of funds to make additions, betterments and extensions to the system. Because of this condition reorganization was held to be necessary.

The new company has been authorized by the Railroad Commission to issue and sell $1,849,000 of interim certificates which later are to be exchanged for a like amount of first and refunding sinking fund 7½% gold bonds, the issue of which is also authorized. Of the proceeds $824,900 is to be used to pay off indebtedness and $932,650 for construction purposes.

PIT RIVER PROJECT UNDER MT. SHASTA CORPORATION

The California Railroad Commission has issued an order permitting the Pacific Gas & Electric Company to transfer to the Mt. Shasta Power Corporation certain properties the P. G. & E. Company obtained from the Northern California Power Company and which have become the foundation of what is commonly known as the Pit River Project. All of the development and construction work on this project is to be done under the name of the Mount Shasta Power Corporation, all the stock of which is owned by the P. G. & E. Company.

SPOKANE VALLEY POWER COMPANY PLANS NEW HYDROELECTRIC DEVELOPMENT

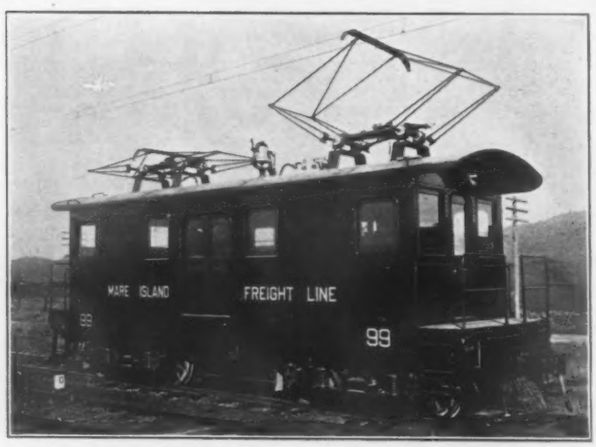
The Spokane Valley Power Company is planning to begin work shortly on the construction of a 65-foot dam at the Bowl and Pitcher rapids three miles below Spokane, for the purpose of developing electric power. There has been considerable delay in connection with this development, as the overflow included a portion of the military reservation at Fort George Wright. The necessary permission to use this territory has now been secured and the work is expected to begin at an early date.

Bowl and Pitcher Rapids, near Spokane, where a new hydroelectric development is contemplated.

WASHINGTON CITIES SEEK AUTHORITY TO SELL ELECTRICITY OUTSIDE THEIR CORPORATE LIMITS

House Bill No. 113, which the city of Tacoma and other cities of the state of Washington are seeking to have passed at the current legislature, provides authority to sell electric current outside their limits. Three amendments have been proposed by Stone-Webster interests, through their attorneys, Frank D. Oakley and C. S. Howe. The House rules

committee has turned the cities' bill over to the corporation attorneys, so that they can work up some amendments which will form the basis of a compromise, which will include a gross earnings tax of 5 per cent on business done outside corporate limits, and a clause requiring the securing of certificates of necessity from the state director of public works, as concessions to the private interests. The city of Tacoma is backing the bill.



ELECTRIC FREIGHT LOCOMOTIVE IN MARE ISLAND SERVICE
The locomotive will handle all carload freight from Napa Junction to the Mare Island Navy Yard. Power is supplied at 3300 volts, single-phase, 25 cycles, and the locomotive is equipped with four Westinghouse Type 132, 100-hp. motors with HB control.

WORK ON THE SPOKANE RIVER PLANT PROGRESSING

A cofferdam 250 feet long is being placed in the center channel of the Spokane river to drain the site for the new power house of the Washington Water Power Company. The power house site is on the south bank of the river, west of Howard street and directly east of the Post street substation of the Washington Water Power Company. The cofferdam will be anchored by cables to the opposite side of the river to keep it from being washed down stream. Forms for the new dam at the Phoenix mill are rapidly assuming shape. As soon as concrete is poured in the forms at the dam construction will begin on the 19-foot concrete penstock. A large motor-driven pump has been placed in operation to drain the south channel of the river west of Howard street, and will permit the cleaning and deepening of the river bed. The total force employed by Grant Smith & Company on the power plant is approximately 180 men.

UTAH SUPREME COURT SUSTAINS PUBLIC UTILITIES COMMISSION IN SPECIAL CONTRACT DECISION

An order by the Public Utilities Commission of Utah, abrogating preferential rates granted by the Utah Power & Light Company, was upheld by the Supreme Court in a decision handed down February 25th.

The preferential rates in question were those granted by the company to about fifty of its large power customers, and the controversy dates back to an order issued by the Utah Commission in September, 1919, wherein the rates specified in the special contracts were classed as discriminatory and preferential and contrary to the public utilities law. The result of extended hearings was a ruling by the Commission, on October 22, 1920, that the power users concerned should be placed on standard schedules.

The special contract holders appealed to the Supreme Court of Utah, contending that the Commission had no right to abrogate any of the provisions of the contracts, since they were entered into before the act creating the Commission was passed. The court upheld the Commission.

This is regarded as a test case, applying in its effect to all the special contract customers of the company in Utah. It is also regarded as a precedent establishing the Commission's complete control over power rates throughout the state.

Trade Notes

Los Angeles Awards Contract for Transformers for 1921 —
The Malony Electric Co., of Los Angeles, has been awarded a contract for all transformers up to 500-kva. capacity, that will be required by the city for the present year.

New Engineering Firm for Portland —
Lewis & Watts, a new engineering firm, has opened offices in the Lewis Building, Portland, Oregon. Mr. Watts for the past six years has been the mechanical superintendent for the St. Paul and Tacoma Lumber Company at Tacoma, and previously was a resident of Seattle for several years.

New Electrical Manufacturing Company in San Francisco —
Jack T. Stewart and E. W. Lange, formerly of Drendle Electrical and Manufacturing, have gone into business for themselves as the Stewart Electrical Manufacturing Company and have opened up offices in San Francisco at 80 Natoma street. They will manufacture safety switches and panel and switch boards and are well fitted to carry on and maintain a high standard of workmanship.

Frank V. Burton Sales Manager for Henry D. Sears —
Frank V. Burton, who recently resigned as general sales manager of the Bryant Electric Co. of Bridgeport, Connecticut, after nearly nineteen years of service with that corporation, becomes, on April first, sales manager for Henry D. Sears, general sales agent for Weber Wiring Devices, 80 Boylston Street, Boston, Massachusetts. Mr. Burton holds a prominent place in the wiring device department of the electrical industry with the various branches of which he has been connected for thirty years.

H. R. Noack, head of the high tension transmission department of the Pacific States Electric Company, has been appointed vice-president of the company. Mr. Noack joined the Pacific States in 1916, soon after selling out his interest in Pierson Roeding & Company, formerly John Martin & Company. In electrical circles he is famous for two other hobbies besides insulators, namely, birds and fishing. He began collecting birds at the tender age of two, and now his home is fitted into that corner of his lot which is not occupied by his bird collection—so far. His skill as a fisherman ranks a close second to his reputation as an ornithologist. Mr. Noack has been connected with high tension work ever since his graduation from the University of California in 1898—in the days when a "large insulator" was seven inches in diameter—a period of uninterrupted service which it would be difficult to surpass. His familiarity with this most important phase of western development makes him eminently well fitted for his new executive position, and the electrical industry joins in congratulating him and the company on his appointment.

MEETINGS OF INTEREST TO WESTERN MEN

(Engineering meetings are the outstanding feature of organization activities of the past two weeks, reports from Seattle, Denver, Salt Lake City, Los Angeles and San Francisco being included here. Action taken by the convention of general contractors at Spokane is another important feature in the news from the Northwest.—The Editor.)

Joint Meeting of San Francisco Sections of A. S. M. E. and A. I. E. E.

A crowded attendance constituting some 150 engineers marked the joint session of the American Society of Mechanical Engineers and American Institute of Electrical Engineers at the San Francisco Engineers' Club on the evening of March 17, 1921. The subject of the evening was "The Present Status of Steam Electric Generation in Fuel Oil Operated Plants of the Pacific Coast." The subject of the evening was introduced by Robert Sibley, editor of Journal of Electricity and Western Industry, who exhibited lantern slides covering all the new and important advances in steam electric generation where fuel oil is used in the various power plants of the Pacific Coast. Mr. Sibley particularly brought out the fact that present tendencies are toward increasing superheat, larger units in prime movers, the increasing of the furnace volume beneath the boilers, the installation of more measuring equipment in the boiler room, the utilization of higher pressures for boiler room practice, and the automatic control of the burning of the oil in the furnace. This paper was followed by the reading of an article by C. H. Delany, fuel oil specialist of the Pacific Gas & Electric Company, who exhibited a series of charts on the keeping of efficiency records in the power plant that will instil enthusiasm and economic vision among the power plant operators. E. A. Rogers, formerly chief engineer of the Cornelia Copper Company at its Ajo, Arizona, power plant, brought into discussion that automatic control of electric power plants under his observation had brought about a saving of from five to six per cent in power plant economy. Thomas B. Stillman, fuel oil expert in the Marine Department of the Babcock and Wilcox Company of New York City, showed how the use of mechanical atomizers was coming into favor in land installations as well as those abroad ship. J. E. Woodbridge, Pacific Coast representative of Ford, Bacon and Davis, closed the discussion of the evening by emphasizing the necessity of accurate instruments and particularly improved apparatus of all types in any plant where a stimulus was to be created among operators for increased economy. The program of the evening was closed by a moving picture presentation entitled "The Why of the Steam Electric Power Plant in Hydroelectric Service." The picture was photographed by V. R. Hughes of the Safety Department of the Pacific Gas & Electric Company, and presented in a beautiful and emphatic manner the instant service made possible in steam electric generation as an auxiliary when anything happens to the hydroelectric network.

California Paper Box Industry Discussed at Industries Meeting

At the March 24th meeting of the California Industries Association the paper box manufacturers of the state of California presented a very interesting program. C. J. Bastedo, general manager of the Paper Box Board Co., which has three large mills in the state of California, presented very interesting statistics on the amount of paper box board which was produced in this state, practically all of which was consumed by the 25 manufacturers of paper cartons in California. In these three mills Mr. Bastedo reported that they were making 250,000 tons daily, and that their investment totaled $7,500,000.

R. E. York of the York Bradford Company of San Francisco also gave a few very interesting statistics on the paper box and carton industry of the state. There are a total of over 4500 employes in these 26 box establishments.

Mr. Max Schmidt, of the Schmidt Lithograph Co., gave a very interesting historical sketch of the growth of the paper box industry as it paralleled the development in the fruit packing of California products.

Utah Electrical Engineers Discuss Plans for A. I. E. E. Convention

At the monthly meeting of the Utah section of the American Institute of Electrical Engineers, held at Salt Lake City on March 4th, H. T. Plumb, chairman of the convention committee, outlined in detail the plans for the national convention of the Institute, which will be held in Salt Lake City next June.

Mr. Plumb submitted plans which have been approved by the national organization, and outlined the work which will be undertaken by the Salt Lake City members in the entertainment of the thousand or more delegates who are expected to attend the meetings.

Professor Joseph F. Merrill, president, and Paul P. Ashworth, secretary of the section, were named a committee of two to represent the electrical engineers on the recently organized Utah engineering council.

E. Bachman, of the General Electric Company, presented a technical paper on "Electric Arc Welding," explaining the strides made in the art of arc welding, which have made it one of the really important developments in the application of electricity to industry.

Denver Section American Institute of Electrical Engineers Holds Regular Meeting

"Valuation and Rate Making Concerning Utilities" was the subject of papers presented by G. H. Throop and H. A. Belden, both of the J. G. White Engineering Corp., at the regular meeting of the Denver Section of the A. I. E. E. March 19. The broad and extensive experience of the two men in this particular phase of the utility business made their addresses of particular interest.

Seattle Section A. I. E. E. Holds Meeting

At the regular March meeting of the Seattle section, A. I. E. E., held in the Chamber of Commerce Assembly Room, Arctic Club Building, on March 15, C. F. Uhden, chief engineer of the hydroelectric development now being constructed by the city of Seattle, addressed the assembled members and guests on "The Skagit River Development." The talk was illustrated with lantern slides, showing the character of the country, as well as work completed and under way. Preceding the meeting, a banquet was held at the Butler Hotel.

Meeting of Synchronous Club

"Recent Developments in 220,000-Volt Transmission" was the subject for discussion at the regular monthly meeting of the Synchronous Club held in the Assembly Hall in the Edison Building in Los Angeles on March 8. R. J. C. Wood, electrical engineer for Southern California Edison Company, outlined some of his important experiments recently made in Stanford University Laboratory in cooperation with Professor Ryan. John M. Morris, sales engineer for Westinghouse Electric & Manufacturing Company, spoke on "Fundamentals Relating to High Voltage Electrical Discharges."

Delegates attending the joint convention of the Associated General Contractors of the Pacific Northwest and the Northwest Master Builders' Association which was held recently in Spokane.

Joint Convention of General Contractors Held in Spokane

At the joint convention of the Associated General Contractors of the Pacific Northwest and the Northwest Master Builders' Association, in Spokane, March 3-4-5, action was taken dissolving the Northwest Master Builders' Association, withdrawal from it of Spokane and Portland builders, and changing the name to Washington State Contractors' Association. The new association will include builders of the state, outside of Spokane. Spokane and Portland builders will join the ranks of the general contractors.

The General Contractors took action to change the name of their organization to the Association of General Contractors of America, Pacific Northwest Chapter, and elected the following officers: Matt M. Dougall, Portland, president; I. N. Day, Portland, secretary-treasurer; vice-presidents—S. C. Morin, Spokane, Frank J. Walsh, Tacoma, and R. E. Miller, Seattle.

The matter of "home rule" proved the stumbling block to the amalgamation of the two organizations, the Seattle builders refusing to enter into any agreement which they feared would necessitate a sacrifice of their right to conduct local affairs in a manner best suited to their needs. Nevertheless, the convention was a most harmonious one, and committees were appointed to work out a more satisfactory plan for future amalgamation.

The board of directors chosen to handle the affairs of the Northwest Chapter of the Associated General Contractors of America follow:

Roy E. Miller, Seattle, of Puget Sound Bridge & Dredging Co.; Frank Walsh, Tacoma, of Albertson-Cornell Bros. & Walsh; J. E. Bonnell, Tacoma, of Bonnell & Son; A. S. Downey, Seattle, of Downey & Quist Co.; W. T. Butler, Seattle, of Butler Const. Co.; Geo. W. Gauntlett, Hoquiam, of Grays Harbor Const. Co.; S. G. Morin, of Spokane; John Clifton, Spokane, of Clifton-Applegate & Toole; W. C. Huetter, of Spokane; Dan G. Munro, Spokane, of General Const. Co.; W. M. Morrison, Boise, Ida., of Knudsen & Morrison; Natt McDougall, Portland, of Guthrie & Co.; I. N. Day, Portland, of A. D. Kern & Co.; E. T. Johnson, of Johnson Contracting Co., and James L. Quinn, of J. L. Quinn Co., Portland.

Seattle Engineering Societies Hold General Conference

Seattle engineering societies, at a general conference held in Seattle and attended by over 200 members, initiated a movement to seek the appointment of engineers to the State Department of Public Works as provided for under the new civil code passed by the last Legislature. Speakers at the meeting, which was held in the Fine Arts Building under the auspices of the Seattle Chapter, American Association of Engineers, included E. J. Arkels, Prof. E. O. Eastwood of the University of Washington, and Ernest B. Hussey.

Los Angeles Section A. I. E. E.

The evening of March 22 was Ladies' Night in the local section of the institute, and a popular program was presented for their entertainment.

Samuel G. McMeen gave one of his customary brilliant talks, his subject being "What We Owe to Pioneers," in which he very clearly brought out the distinction between "visionaries" and "men of vision," the former being a term of reproach when a man enters a new line of thought, and the latter being an expression of commendation when he has made good.

Mr. McMeen was followed by N. I. Prosser, who gave a demonstration of high frequency apparatus. Mr. Prosser has constructed a device for rotating a geisler tube while it is connected to a high frequency circuit. This gives an effect like a pin-wheel, and many novelties are worked out by introducing a mechanical circuit-breaker which interrupts the current and gives kaleidoscopic effects.

A three reel motion picture of the life of Thomas Edison and some jazz music by the students of California Institute of Technology concluded the program.

Northwest Conference of National Association of Credit Men Guests of Seattle Association

The Seattle Association of Credit Men entertained the annual Northwest Conference of the National Association of Credit Men on March 21. J. H. Tregoe, secretary-treasurer of the National Association, the largest commercial organization in the country, with 32,000 members and 130 affiliated branches, attended the meeting. The first two sessions and luncheons were held at the Elks Club, and the banquet and evening session at the Masonic Club.

Eltringham Addresses Electric Club

Robert Eltringham, executive secretary of the California Cooperative Campaign, was the principal speaker at the weekly luncheon of the Electric Club in Los Angeles on March 21, his subject being "Industrial Lighting."

Mr. Eltringham gave his audience some new ideas on proper lighting as it affects the cash drawer of the business man, his argument being that when, through improper lighting, a worker's vision is only 60% efficient, his production is bound to be limited to the same ratio. When lighting conditions are improved, the artisan's work improves, and the result is immediately reflected in the cash drawer.

Other speakers on the program were G. E. Arbogast and E. L. Spring, who spoke on the electrical home idea. Motion pictures of the Adobe Electrical Home in Los Angeles closed the meeting.

COMING EVENTS

PACIFIC COAST SECTION, NATIONAL ELECTRIC LIGHT ASSOCIATION
Annual Convention—Del Monte, California, June 7-10, 1921

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Annual Convention—Salt Lake City, Utah, June 20-26, 1921

NATIONAL ELECTRIC LIGHT ASSOCIATION
Annual Convention—Chicago, Ill., May 31-June 2, 1921

AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Spring Meeting—Chicago, Illinois, May 23-26, 1921

CALIFORNIA STATE ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS
Annual Convention—Santa Cruz, June 16-18, 1921

SOUTHWESTERN ELECTRICAL & GAS ASSOCIATION
Annual Convention—Galveston, Texas, May 18-21, 1921

LATEST IN APPLIANCES AND EQUIPMENT

(To prevent shocks from wet hands coming in contact with pull chain sockets used in kitchen, laundry or bath room, a small insulator has been devised to fit in the chain. There are also accounts of new automatic cut-outs, portable instruments and regenerative compressors. There is also a review of the new edition of Sibley and Delany's "Elements of Fuel Oil and Steam Engineering."—The Editor.)

PEERLESS HOOK-ON INSULATOR FOR PULL CHAIN SOCKETS

With wet hands, as in the laundry, kitchen or both, it is possible to get shocked when the socket chain is pulled. The Peerless Hook-On eliminates this by completely insulating the chain from the socket with its small but sturdy fibre core. Two brass hooks easily slip over the ends of the shot chain and a pinch on each hook fastens them permanently in place.

G-R REGENERATIVE COMPRESSOR

The Griscom-Russell Co. of 90 West Street, New York, are placing on the market a unique patented apparatus known as the G-R Regenerative Compressor. This apparatus is designed for installation on Reilly Evaporators and its use during periods of reduced evaporator capacity permits evaporator operation at an efficiency much greater than can be secured by the evaporator operating alone, single effect.

It is customary to install evaporators on board ship of a size suitable for the maximum distilled water requirements at full speed, but it is evident that there are many occasions when this maximum evaporative capacity is not required, as for instance, when a vessel is operating under reduced speed or is in port.

NEW PORTABLE INSTRUMENTS

For tests on batteries for automobiles, farm lighting equipment, etc., the Type PI Portable Instruments, recently placed upon the market by the Westinghouse Electric & Manufacturing Company, have been found extremely desirable. There are no springs or moving coils in these instruments, and great simplicity and ruggedness are obtained. Dead-beat indications are assured because of an efficient damper. A moving soft-iron vane polarized by a stationary permanent magnet and deflected over its scale by the action of a stationary current coil, furnishes the moving element. Other uses for these instruments are for tests on electrical toys, radio apparatus and amateur experimenting. These instruments are assembled in moulded composition cases, which are 2¾ inches overall. The instruments weigh only six ounces.

The Type PX Portable Instruments, manufactured by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, are direct reading instruments for general testing purposes. These instruments are handy and serviceable, and have a wide application for central station analysis tests, trade school, high school and college equipment tests, and radio apparatus tests. These instruments are particularly adapted for automobile and battery testing.

NEW AUTOMATIC CUT-OUT IN STREET LIGHTING

The General Electric Company has developed and is today marketing a magazine cut-out, which overcomes the objections to the older styles. It consists of a capsule containing a roll of dielectrically treated fabric. This compact, waterproof capsule is inserted in the opening between the clips of a standard G-E series socket. A short length of the fabric is first drawn out of the capsule between the clip faces. When a lamp burns out the film at once punctures, closing the shunt circuit, and allowing the other lamps to burn on without interruption. The old devices very often punctured cutting out the lamp without cause, or refused to puncture at the right time, thus plunging a section of the city into darkness.

Renewal by the lineman is a simple matter with the new cut-out. He removes the socket, separates the clips and pulling out the punctured section of film tears it off. His fingers, often oily and dirty, never come in contact with the new section of film which has been pulled into place. There is no groping in the pockets for the old insulating discs or rings often rendered useless by dampness or dirt, nor is there the temptation to insert a bit of tape, a match or other foreign substance between the clip discs when the right material is not at hand, a procedure which in the past has often raised havoc with lighting circuits.

NEW WESTINGHOUSE GENERATOR

To meet the need of the small and medium size low head water power applications, a line of low speed vertical shaft generators has been placed upon the market by the Westinghouse Electric & Manufacturing Company. This line of generators has been designed in its mechanical features to meet the special requirements of the combined hydraulic unit. The generator base is of such diameter as to permit a wheel pit of sufficient diameter to provide for the ready removal of the turbine runner and head cover. Each generator frame is provided with a Kingsbury thrust bearing and upper and lower guide bearings. All bearings are lubricated by a self-contained, circulating oiling system. An exciter driven pulley and idler pulley for use with a horizontal belted exciter are included with the generators. The standard generator parts are so designed that a mechanically operated friction brake can be supplied when desired. Provision is made, where unusual hydraulic or load conditions prevail making additional flywheel effect necessary, for mounting a separate fly below the shaft coupling. These sets should be of particular interest to Western power companies.

Books and Bulletins

Elements of Fuel Oil and Steam Engineering

By Robert Sibley and C. H. Delany. Second edition, completely revised and enlarged. 466 pp., 6 x 9, 250 illustrations. Published by McGraw-Hill Book Co., Inc., New York. For sale by Journal of Electricity and Western Industry, San Francisco.

The second edition of the book entitled "Elements of Fuel Oil and Steam Engineering," by Robert Sibley and C. H. Delany, has just made its appearance from the press of the McGraw-Hill Book Company in New York City. The new book contains all of the information contained in the first edition. There has, however, been added to the information there contained almost 100 percent additional matter, so that the work now presented to the trade contains almost five hundred pages of reading matter with over two hundred and fifty illustrations showing all sorts and types of installations in fuel oil equipment for steam generating purposes. A great many additional discussions have been added to the work, due to suggestions made by such men as Professor L. S. Marks of Harvard University; Professor W. F. Durand of Stanford University; Mr. C. R. Weymouth, chief engineer of Charles C. Moore & Company; J. E. Woodbridge of Ford, Bacon & Davis, and other well known authorities on the use of fuel oil. The added matter might well be classed as economic information of great importance to the steam electric engineer where oil is used as fuel, and includes discussions of chimney properties in fuel oil practice, rules for operation, oil fired plants, how to better daily economies in power plant operation, and a host of practical tabulated data for every-day use.

A great deal of operating information in power plants showing the modern trend in power plant development, such, for instance, as the use of automatic control, the installation of larger furnace equipment, and the application of higher steam pressures and greater superheats in boiler room operation, is also brought out in the new pages. So far as we are aware, there is no book on the market which in any sense of the word fulfils the functions that will be performed by this enlarged publication. On the Pacific Coast the use of fuel oil in steam electric generation has become a classic, and this practical treatise dealing with fuel oil for the central station man, the power plant operator, the mechanical engineer and the student, bids well to find a place on the bookshelves of operating engineers throughout the world wherever oil fired boilers are in use for the generation of steam.

NEW ELECTRICAL and INDUSTRIAL DEVELOPMENTS

(Six new 12,500-ton steel tanks to be built in Everett and enlargements to the plant of the Sound Rubber Company are optimistic reports from the Northwest. The Pacific Central district news is encouraging, with new electric consumers on all power company lines and plans to make San Rafael a bay port. Building activities are the predominant note from the Southwest, while the Intermountain district reports activities in mining districts and petitions for reduction of freight rates.—The Editor.)

THE PACIFIC NORTHWEST

BELLINGHAM, WASH.—Laube & Sons, Inc., have installed an electrical department to be run in connection with their local battery and sheet metal business. The department will be in charge of W. H. Franklin.

VANCOUVER, WASH. — The California-Oregon Paper Mills will begin construction of an immense sawmill here within 90 days, it is understood, providing the city will vacate two street ends. Neil B. Sinclair is local manager for the company.

VANCOUVER, WASH. — The million-dollar plant of the Howe Sound Mining & Smelting Company at Brittania Beach, is reported to have been destroyed by fire on March 20. Details, owing to interrupted telegraphic service, have not been obtained.

SOUTH BEND, WASH.—The Menlo Lumber Company, recently organized, headed by F. W. Lang, a Seattle lumber broker, plans the immediate erection of a saw mill here to have a daily capacity of 30,000 ft. The proposed plant will be electrically operated throughout.

MEDFORD, ORE.—With the recent establishment of two construction camps near Jacksonville and Central Point, the building of the new Medford district irrigation system is employing about 50 men. Other camps will be established as the weather settles and the force will be increased until 300 men are employed.

EVERETT, WASH.—M. G. Tholme, president of the Norway-Pacific Shipbuilding Co., states he has closed a contract for six 12,500-ton steel tankers which involve the expenditure of $15,750,000. Keels for three of the tankers will be laid immediately, he states, and approximately 2500 men employed in the plant.

SPOKANE, WASH.—The Amalgamated Gold Mines Company of Blewett will build a $50,000 hydroelectric plant at its property this summer, it is announced by C. R. Hesseltine, president. The company has been operating its plant since January 1, dropping 10 stamps and disposing of 30 tons of ore daily. It employs 35 men.

SALEM, ORE.—The Oregon Pulp & Paper Company of Salem has filed application with the state engineer for the appropriation of 465 second-feet of water from Mill creek and the north fork of the Santiam river for the development of 1300 hp. The power will be utilized in the paper mill of the company at Salem.

CENTRALIA, WASH.—The Centralia Mill Work & Supply Company which recently took over the Iceless Refrigerator Company of Vancouver, Wash., will immediately begin remodeling and enlarging the plant to permit of the manufacture of refrigerators and also bedroom furniture. N. E. Greenleaf is president of the company.

SEATTLE, WASH.—A minimum of $40 and a maximum of $50 will be paid farm hands by the farmers of Kittitas Valley, Wash., this year, according to the decision reached at a meeting of members of the Kittitas County Farm Bureau, of which S. P. Whipple is president. Scale will include board and room and will be effective only until the harvest period.

SEATTLE, WASH.—Seattle School District No. 1, Reuben W. Jones, secretary, desires bids until April 13 for the general contract for erection of the proposed Roosevelt High School. The proposed structure, for which plans were prepared by School Architect F. A. Naramore, will cost in excess of $1,000,000.

SPOKANE, WASH.—The Washington Water Power Company is making an investigation of the power possibilities of Kettle Falls on the Columbia river in Stevens county, with a view to purchasing a power site, according to statements of company officials. A party of 15 engineers is making a preliminary survey. The power company has four plants on the Spokane river, and a fifth under construction.

SEATTLE, WASH.—Puget Sound cities have filed application with the Interstate Commerce Commission for a rehearing in the Columbia Basin rate decision granting to Portland a differential in rates from points south of the Snake river. The contention of these cities is that the commission failed to take into consideration all the facts in the case, particularly the reduced operating expenses of the Chicago, Milwaukee & St. Paul since the electrification of that road.

BANDON, ORE.—As a result of the $110,000 bond issue carrying at the recent special election, for the establishment of a municipal light and power system, the city of Bandon will immediately proceed to sell the entire issue. $35,000 of the amount will be used to purchase the system of the Bandon Power Company and the balance will be used for the construction of a hydroelectric plant at Willow creek and a transmission line to the town of Bandon. The Miller Engineering Company of Seattle will do the work.

TACOMA, WASH.—The request of the American Nitrogen Products Company at La Grande for a 30 per cent reduction in the price of municipal electric power was recently denied by the city council. C. F. Graff, president of the company, in a letter to the council, stated that if the rate for power was reduced the company would be able to reopen its plant, which closed last month, and which would give employment to many men. Commissioner of Light and Water Davisson stated that it would be impossible to supply power, even at off-peak periods, for less than the old rate.

OLYMPIA, WASH.—The Public Service Commission recently ordered a reduction in wholesale rates on electric current supplied the Washington-Idaho Water, Light & Power Company, by the North Coast Power Company, from $3.75 a kilowatt-hour monthly to $2.45. The Washington-Idaho company serves Winlock, Napavine, Castle Rock, Toledo, Vader and Woodland. The Commission does not expect a decrease in consumers' rates, but expects to prevent an increase by the wholesale rate reduction.

TACOMA, WASH.—Stockholders of Western Rubber Company, at a recent meeting, gave unanimous approval to the plan of increasing the capital stock of the company by the issuance of preferred stock in the sum of $1,500,000 additional, and the changing of the name to the Sound Rubber Company. Plans for enlargement of the plant provide for an increase in production to 1,000 tires and the same number of tubes a day. Construction work which will start in the near future will include additions to the present building, and installation of added machinery.

SPOKANE, WASH.—President A. W. Leonard of the Puget Sound Power & Light Company will send representatives of the Stone & Webster interests to Wenatchee Valley immediately to make a survey of the situation with a view to entering this field. The Stone & Webster interests have been considering taking over the Wenatchee electric system for some time and it is believed they are now ready to make some kind of an arrangement whereby they will be enabled either to acquire the plant of the Wenatchee Valley Gas & Electric Company or else supply the public through some other source.

VANCOUVER, WASH. — The Northwestern Electric Company, which operates a distribution system in Portland, Oregon, has applied to the city council of Vancouver for a franchise to operate in that city. It is understood that the company will extend its Condit plant transmission line from Camas to Vancouver, a distance of about 13 miles, and tie-in with their Portland system by a cable crossing the Columbia river near the S. P. & S. Railroad bridge. If the company should later develop its 25,000-hp. hydroelectric project on the Lewis river it is probable that the transmission line from this plant would enter Vancouver, tying in with its system there.

SEATTLE, WASH.—J. H. Shields, superintendent of Seattle's municipal employment department, is authority for the statement that the peak of the unemployment problem, as far as Seattle and the Puget Sound district is concerned, has been passed, and from now on conditions will gradually become better. Late spring or early summer will, according to Mr. Shields, find the problem solved. The highest point in the unemployment situation was reached about the middle of February, when there were approximately 10,000 idle men in Seattle. However, since the first of March, with the reopening of logging camps, lumber and shingle mills, and beginning of spring activities on dairy ranches and truck farms, this number has been gradually reduced. Demand from eastern Washington wheat farms and fruit ranches, which has started to develop, will also assist materially in absorbing the problem.

THE PACIFIC CENTRAL DISTRICT

EUREKA, CAL.—Enlargement of the Whipple Street station of the Western States Gas & Electric Company will soon be under way. The expenditure will be approximately $30,000.

OROVILLE, CAL.—Operations will be resumed at the Steifer mine, a transmission line having been constructed to supply power for the mine by the Pacific Gas & Electric Company.

OAKLAND, CAL.—O. H. Fisher, president of the Union Gas Engine Company, has announced the sale of six four-ton gas engines to Mexican interests and attributes the sale to the recent visit of the Mexican "good will commission."

RED BLUFF, CAL.—The city is considering the advisability of installing an electric plant to cost about $169,000. City engineer Luning has presented a plan to the board of trustees.

STOCKTON, CAL.—During the month of February 460 horsepower of power business was added to the lines of the Western States Gas & Electric Company for irrigation purposes in the Lodi district alone. The size of the motors ranges from 5 hp. to 20 hp. This class of business is increasing very rapidly.

SAN FRANCISCO, CAL.—Work on the mortising of the big dam at Hetch Hetchy has been begun by the Utah Construction Company. The walls on both sides of the canyon are being cleaned of debris and a cut is being made to bedrock at from 50 to 100 feet below the river bed.

SAN FRANCISCO, CAL.—Details of the tentative plans for the organization of a huge irrigation district of approximately 200,000 acres in Nevada county were disclosed with the filing of a preliminary petition with the state department of engineering. It is estimated that preliminary work will require several months, although the filing of the petition is taken to indicate in official engineering circles that the promoters are determined to bring the project to a head as soon as is physically possible.

FRESNO, CAL.—Plans are ready for constructing the first unit of a large rubber tire manufacturing plant in Fresno, Warren S. Munger, president of the Superior Oil Company, announces. Reinforced concrete three-story buildings will be erected on a site south of Belmont and adjoining the Southern Pacific tracks. The plant, scheduled to be in operation by the early fall, will have a daily output of 500 cord tires and 1,750 tubes, employing about 400 men. The new Fresno cord tire, which is to be the staple manufacture, will have a guaranteed 15,000 mileage.

SAN FRANCISCO, CAL.—With favorable legal opinions on the titles and right-of-way for the proposed new canal to San Rafael, which were given by the United States attorney, the way has been cleared for connecting the city with the bay, according to an announcement of P. F. Wood, chairman of the canal committee. The deep canal is to be connected with the river channel and $60,000 has been appropriated by the government and the state as well as by a special city tax. The project of establishing San Rafael as a bay port by means of the canal has been under consideration for several years.

RICHMOND, CAL.—The Western States Gas & Electric Company has secured a renewal of the present street lighting contract with the city of Richmond and in addition contracted for the installation of 120 steel poles on MacDonald Avenue between First Street and Twenty-third Street, and 20 poles at Pt. Richmond. Each pole will be equipped with 400 candle-power lamps and in addition to the illumination will carry the secondary voltage wires of the company and will also be the support of the trolley wires of the San Francisco-Oakland Terminal Railways. So far as is known this is the first installation of this kind on the Pacific Coast.

THE PACIFIC SOUTHWEST

FULLERTON, CAL.—City Engineer Duppy has prepared plans for an ornamental lighting system on Spadra Avenue, to cost about $25,000.

LONG BEACH, CAL.—Plans have been prepared for a new city hall building which will cost $400,000. W. Horace Austin is the architect.

SAN BERNARDINO, CAL.—The Santa Fe Railway has appropriated $700,000 for the improvement of facilities on its coast lines, of which $500,000 will be spent in the San Bernardino shops. Plans will be prepared in the Topeka office.

SAN PEDRO, CAL.—H. H. Walker, Hibernian Building, Los Angeles, was awarded the contract to install additional electroliers on Seventh Street to cost $11,294.

PHOENIX, ARIZ.—Ground has been broken and work will proceed rapidly on the new Elks Building. Herbert Mann has the contract, which amounts to $400,000.

SAN DIEGO, CAL.—K. E. Parker Co., Clunie Building, San Francisco, have the contract for a six-story warehouse to be erected by the Navy Department, to cost $441,900.

SAN DIEGO, CAL.—Lange and Bergstrom, Timken Building, San Diego, submitted the lowest bid for the erection of seventeen buildings here for the Naval Training Station, to cost $934,369.

SAN BERNARDINO, CAL.—The Southern Sierras Power Company plans to spend $100,000 during the present year on improvements to its steam plant. This will include additional transformers, switchboards and meters.

LOS ANGELES, CAL.—The Los Angeles Gas and Electric Corporation has prepared plans for an additional gas holder of 10,000,000 cubic feet capacity, to cost $1,000,000. Plans also call for a compressor with a capacity of 1,000,000 feet per hour, and 100 miles of new mains.

SANTA BARBARA, CAL.—Tentative plans have been prepared for the organization of a district to increase the water supply for Summerland and Carpinteria by constructing a dam on Santa Ynez river. The project, including reservoirs and tunnels, will cost $1,800,000.

THE INTER-MOUNTAIN DISTRICT

TWIN FALLS, IDA.—The Idaho Power Company has applied to the Federal Power Commission at Washington for permission to develop hydroelectric power at Twin Falls on the Snake river. The proposed development is about eight miles up the river from the city of Twin Falls.

SALT LAKE CITY, UTAH.—Articles of incorporation have been filed with the secretary of state by the Rich County Irrigation Company, having a capital stock of $25,000, divided into $5 shares. V. R. Gallentine of Ogden is president, D. W. Ballantyne of Wyoming, vice-president, and L. J. Gallentine, Ogden, secretary-treasurer.

SALT LAKE CITY, UTAH.—Utah Copper Company is planning for the installation of a 60,000-kw. plant to furnish power for the operation of its Utah properties. It is supposed that this proposed installation is the result of the recent decision of the Utah Public Utilities Commission which increased the rates for power throughout the state, particularly affecting the larger users who previously obtained special reduced rates.

BOISE, IDA.—Petitions asking for reductions in the freight rates of railroads serving southern Idaho have been sent to the railroads by the Boise traffic bureau. Reduction of 25 per cent is asked on the rates for apples shipped to New York, Chicago and to points along the Missouri river; potatoes to Chicago, Texas and points along the Missouri river; deciduous fruits from New York, Chicago and the Missouri river; wheat to Chicago, wool to Boston and cattle and sheep to Chicago and points along the Missouri river.

IDAHO FALLS, IDA.—At an enthusiastic meeting of representatives of the Oswald Basin tract, engineers and those interested in the project recently introduced for the irrigation of the Oswald basin, held on February 12, there was organized the Oswald Basin Irrigation Association. C. J. Oswald was elected president of the association, William Shannon, secretary, and L. A. Hartet, treasurer. Twenty-three landholders were present and about thirty thousand acres were represented. The project will cost about $1,300,000.

MINA, NEV.—The Simon Silver-Lead Mines Company has prepared prints of the flow sheet of the mill now being constructed, and announces that construction is 60 per cent completed and that 90 per cent of the machinery and materials are on the ground. The mill will employ the Minerals Separation selective flotation process, the zinc and lead being separated. The mill has a crushing capacity of 150 tons per twenty-four hour day. The product, zinc and lead concentrates, will be hauled to Mina by auto truck and shipped to the smelter of the United States Smelting, Refining & Mining Company at Midvale, Utah, for treatment.

BRIGHAM CITY, UTAH.—The Brigham City Irrigation Company, recently formed to purchase 25 second-feet of water from the Hammond Canal Company, is ready to proceed with the construction of the canal. The company has provided that all subscribers of stock who desire to make their first payment of 10 per cent of the stock in work on the ditch may do so, and an alignment of this class is now being secured in order that work may be started at once. The canal will pass through the northern, western and southern parts of Brigham City and will traverse many city lots. It is the purpose of both the local company and the canal company to have the new canal system completed in order that the water may be used during the coming irrigation season.

PRICE, UTAH.—An irrigation project in which is involved close to twenty-five thousand acres of land is made public through an application to the state engineer of Utah for the diversion of 12,000 acre-feet of water in Emery county. The applicants are D. H. Leonard, F. M. Lyman, Jr., Peter Barboglio of Price, and J. P. Brockbank, and they seek to take this amount of water from the Huntington river in Emery county. It is proposed to construct a concrete dam which is to be one hundred feet in height with a length at the top of five hundred and seventeen feet. In this it is proposed to store sixty-three hundred acre-feet of water twice a year. The distributing canal, which is to be fourteen miles long, will be of earth and a flume.

SALT LAKE CITY, UTAH.—"The American Falls dam, when completed, will be the largest in the world, and the Idaho Reclamation Association will take no small credit for making it an accomplished fact," said Major Fred R. Reed, managing director of the association, who is in Salt Lake City from his Pocatello headquarters. "Progress on the preliminary work for the project is going ahead satisfactorily. There is a tremendous amount of work to be done before the first pick is stuck into the ground. The government must secure title to 70,000 acres for the reservoir and the entire city of American Falls must be moved to another site. So far more than $150,000 has been spent on the new townsite and surveys. The project manager, Barry Dibble, has an office force of about fifty people at work now.

PROVO, UTAH.—Because of the difficulties in obtaining labor and material during the war, the Telluride Power Company was unable to complete its power project in Beaver River canyon within the time limit, and has petitioned the U. S. District Court for relief. The court is asked to set aside the ruling of State Engineer George F. McGonagle, allowing only a one-year extension, and to grant two years instead. A permit for diverting the waters of the canyon was granted in 1917, with a time limit of December 31, 1920. Since that time more than $100,000 has been spent on the project in roadways, bridges and the laying of 12,700 feet of thirty-six inch wood pipe line. This will be a loss if sufficient time is not granted to complete the original scheme, according to the bill of complaint which has been filed.

TEN FAMILIAR ALIBIS

We had a puncture and had to walk two miles to the nearest garage.

Some friends came in unexpectedly and we were unable to get away.

I tried several times to telephone you but they said the line was busy.

My watch was seventeen minutes slow.

She had a severe headache and decided to stay at home.

I was detained at the office.

We had to wait twenty minutes for a street car.

An out-of-town engagement will prevent my being present.

I mislaid your address.

The alarm clock did not go off.

[As we are compiling a volume entitled "Helpful Hints for Helpless Humans" we should appreciate any suggested additions to the above list.]

* * *

RHETORICAL RIDDLES
For the Simple Minded

Do ships have eyes when they go to sea?
Are there any springs in the ocean bed?
Does a jolly tar ooze from a tree?
Can a river lose its head?
Can a blacksmith's vise condemn his soul?
Can a book be white and read?
To whom does a church bell pay its toll?
Who shingles the water shed?

* * *

One of the brilliant minds that grow in our office has conceived the idea of using revolving doors to generate power. Some banks and hotels we know would soon be serious rivals of central stations, and if all moving picture theatres were fitted with revolving doors we might eventually do away entirely with regular power houses. There might be a little sign over all revolving doors reading, "Do Your Bit."

* * *

A fountain pen which appeals strongly to our imagination is one recently advertised as capable of holding both red and black ink. A simple mechanism causes either color (or both?) to flow at the will of the writer. Think of the artistic possibilities of a letter written with this pen! And now that the idea has been started, why stop at red and black ink? Why not purple, blue, and green, so that every sentence can be given its appropriate coloring, and we no longer lose in "cold black and white" the delicate intonation of the spoken word? Of course, the letters of the very temperamental would strongly resemble the wrapper on a package of fire crackers, but why not? We recommend the idea to diplomats, poets, writers of "chain letters," finance committees, and people with "souls."

A bright idea appeared in a Seattle paper some time ago, in response to a request for suggested solutions of the street railway problem. It read as follows:

"The power to the cars is carried to the cars by means of cables which are uninsulated. These serve as aerials by which the electricity is given off into the air. The percentage runs up to a very dangerous percentage, and as there are some 100 miles of these cables you will readily see that much valuable current is lost.

"By insulating three-fourths of the wire and leaving the lower section of it bare a great deal of this will be saved, still providing for a perfect contact between the trolley and the cable. The result would be more power at a lower cost. A faster speed could be obtained and thus attract some people who take to the jitneys only because of speed. Speed would also cut down the force necessary to run the cars."

Wonder what our engineers have been doing, not to have thought of such a simple thing before.

* * *

ELECTRICAL HYBRIDS

XII—The Electric Toasterrier

Watch the Toasterrier: you never can tell
Just when he will make up his mind to raise—well,
That is to say, he is very hot stuff
And never will stop when he's gone far enough.

If you want to prevent any scandalous waste
You must take off the bread when it's browned to your taste,
For though he's not bad, he delights in a joke,
And if you forget it, it goes up in smoke.

But in spite of his mischief, you'll never regret
That you have him at meals when the table is set;
You can eat on the porch, on the stairs, in the hall,
And never go into the kitchen at all.